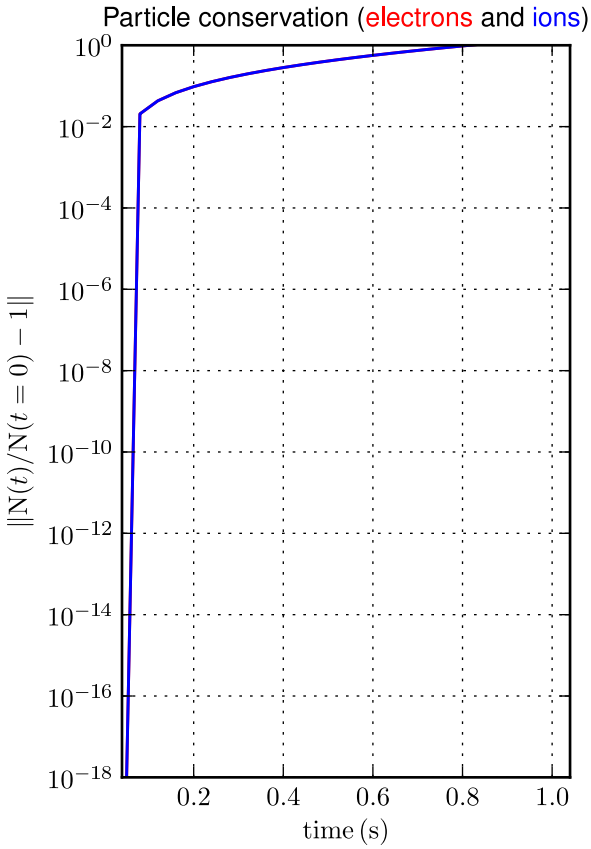
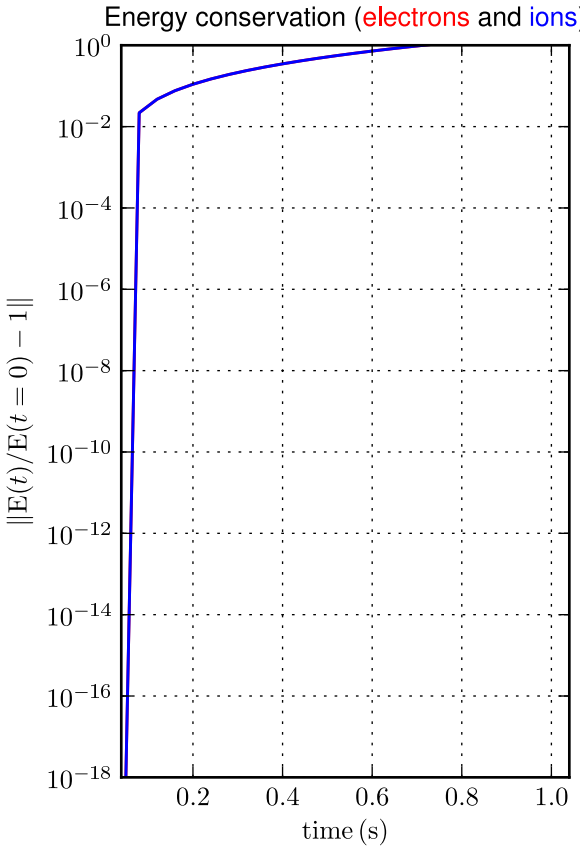
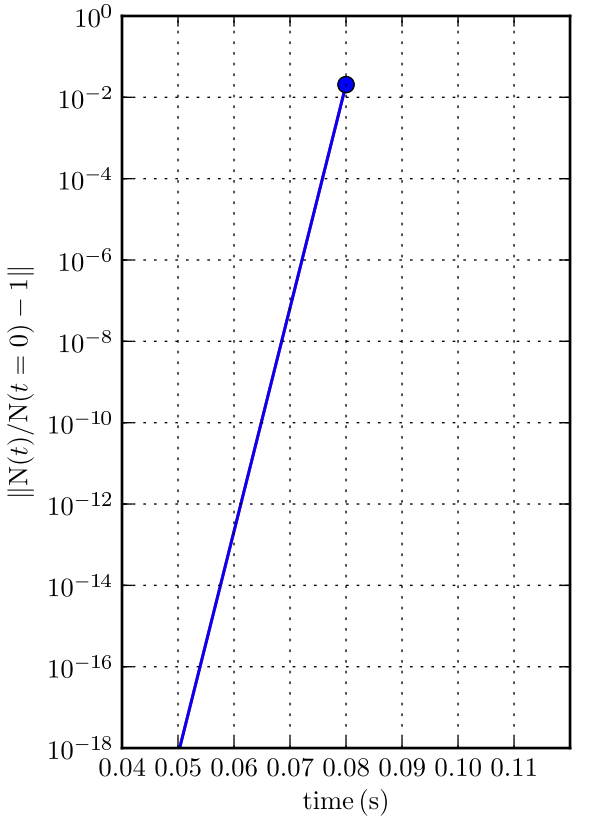
Part. & Energy conservation

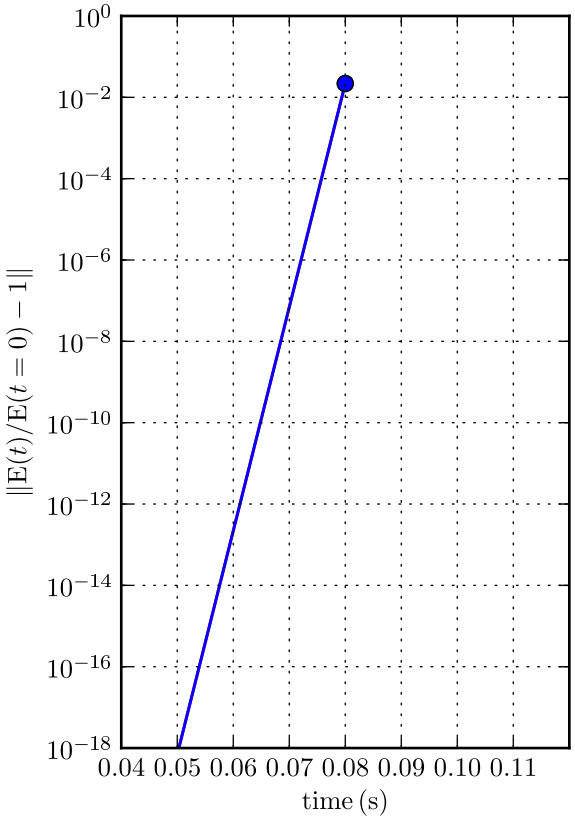
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - log scale; total time and zoom over time





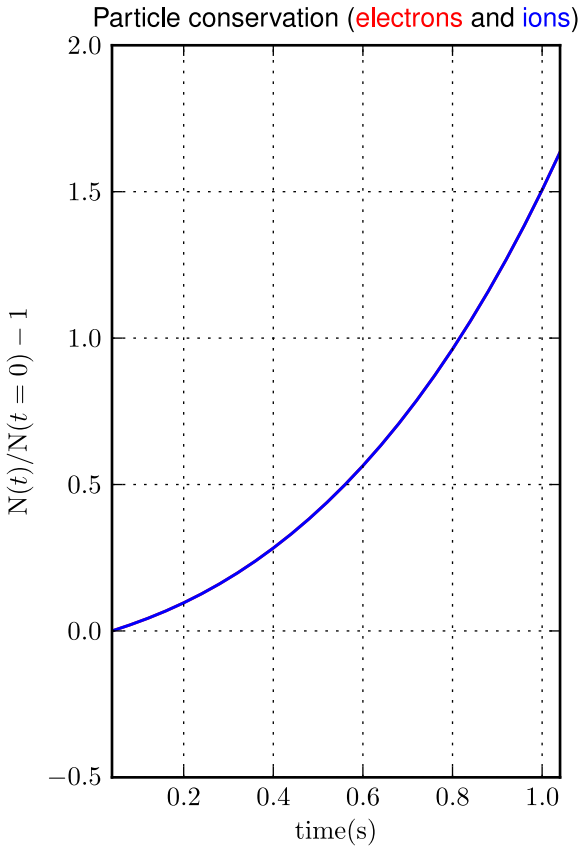


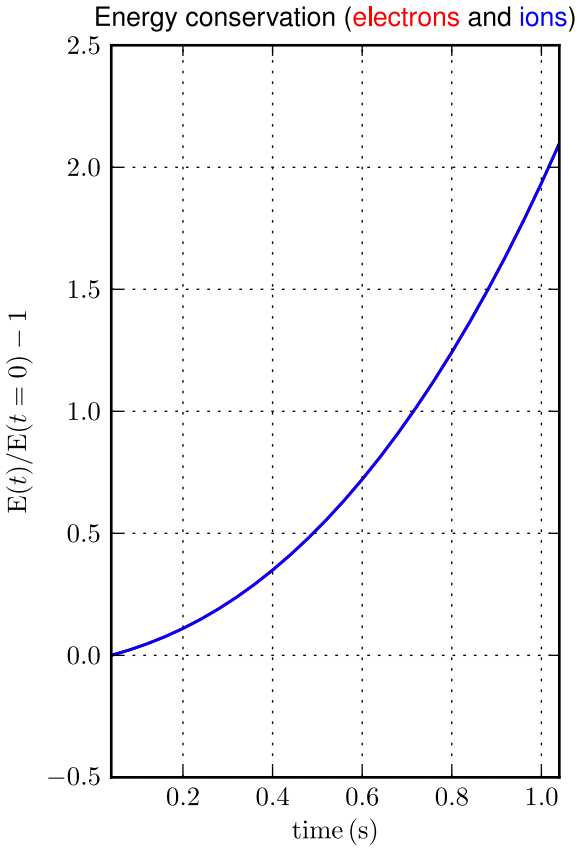


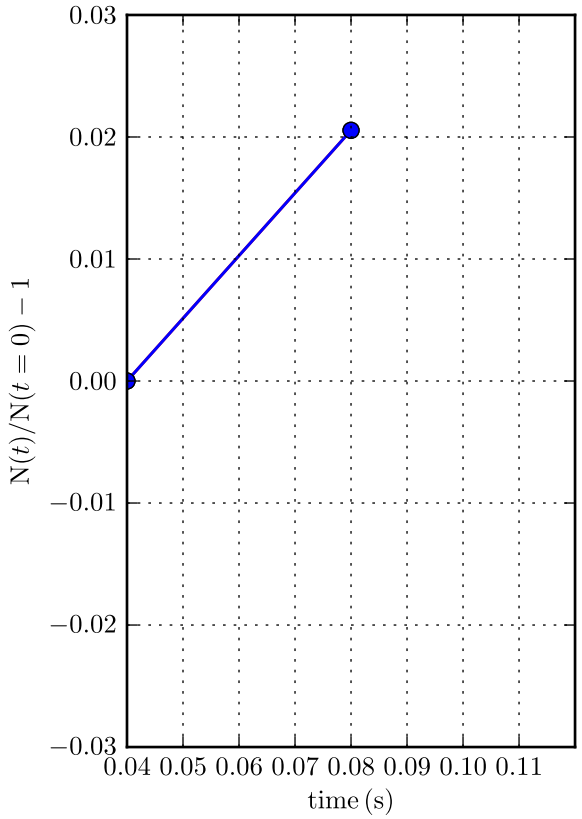
Part. & Energy conservation

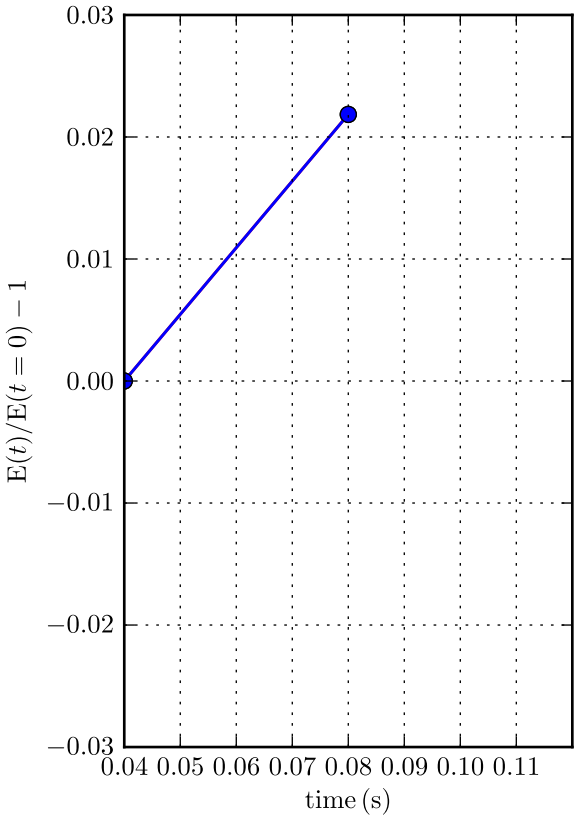
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - linear scale; total time and zoom over time







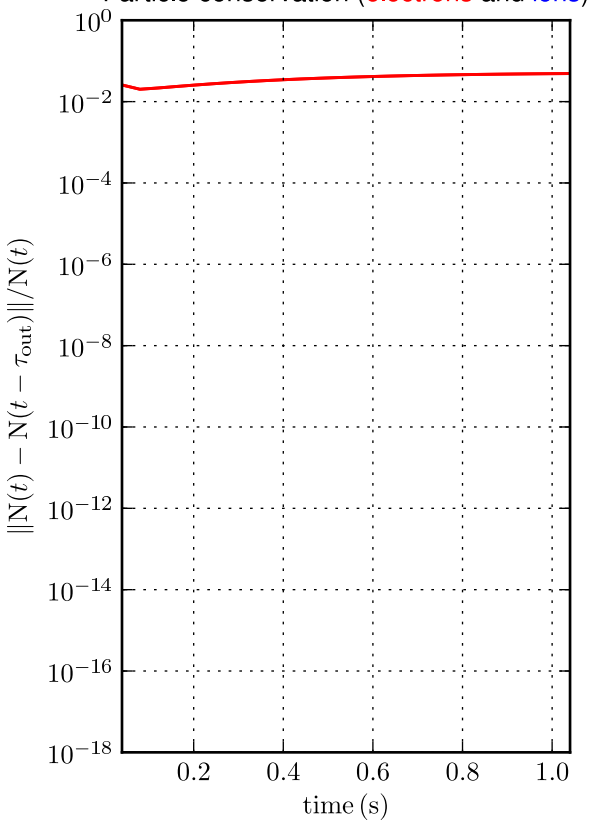


Part. & Energy conservation

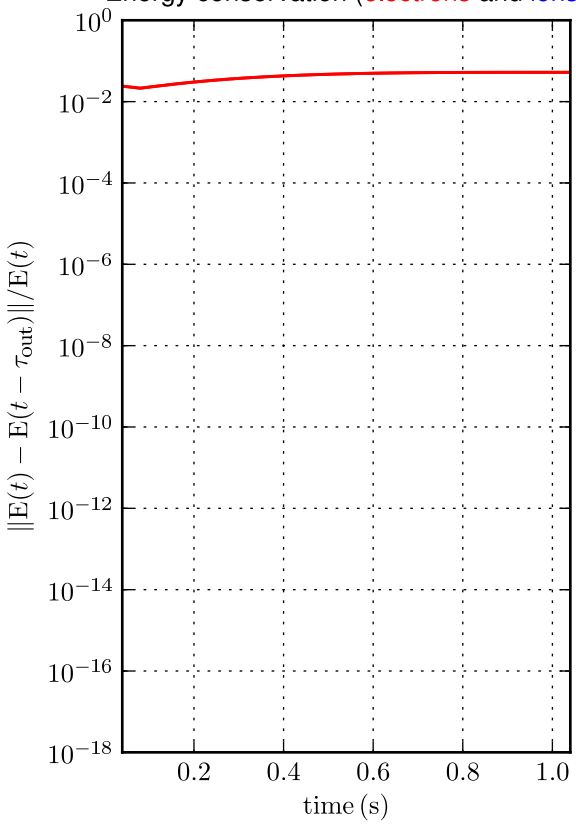
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

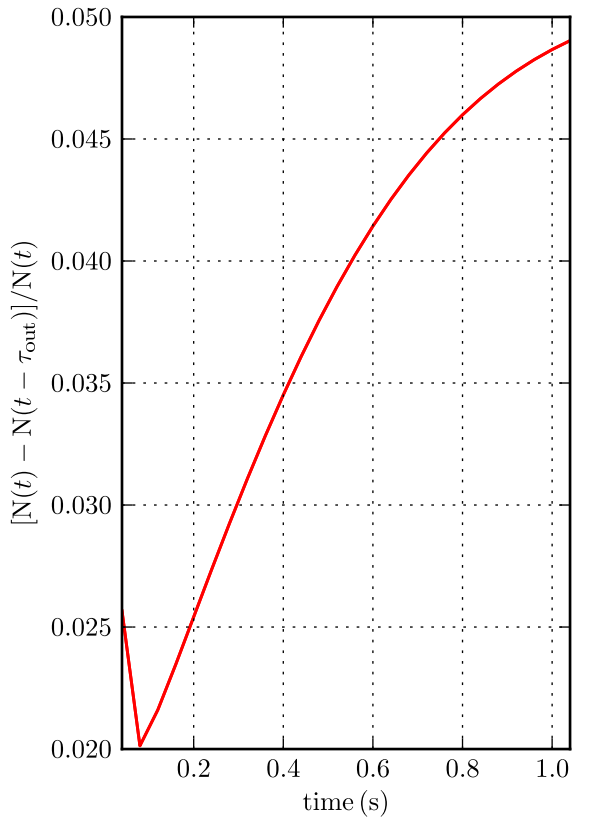
Comparison with previous time-sampled (τ_{out}) solution - log and linear scales

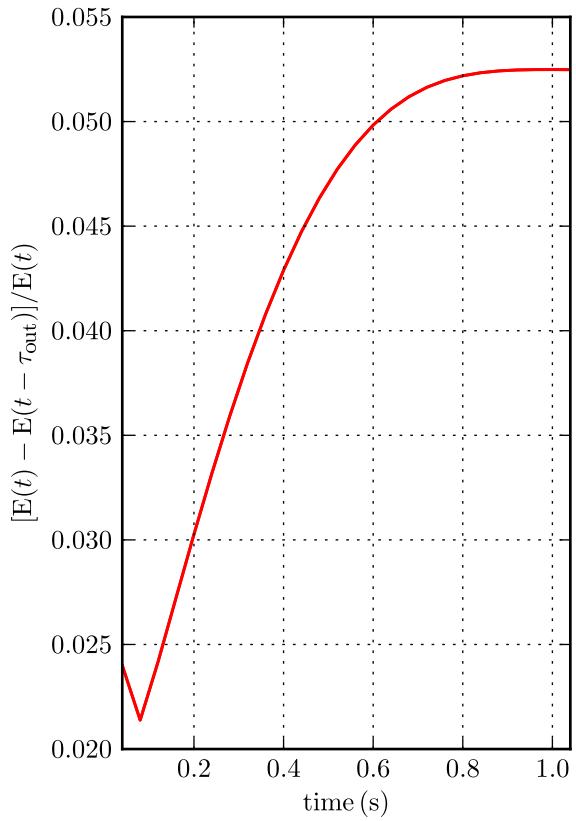
Particle conservation (electrons and ions)



Energy conservation (electrons and ions)



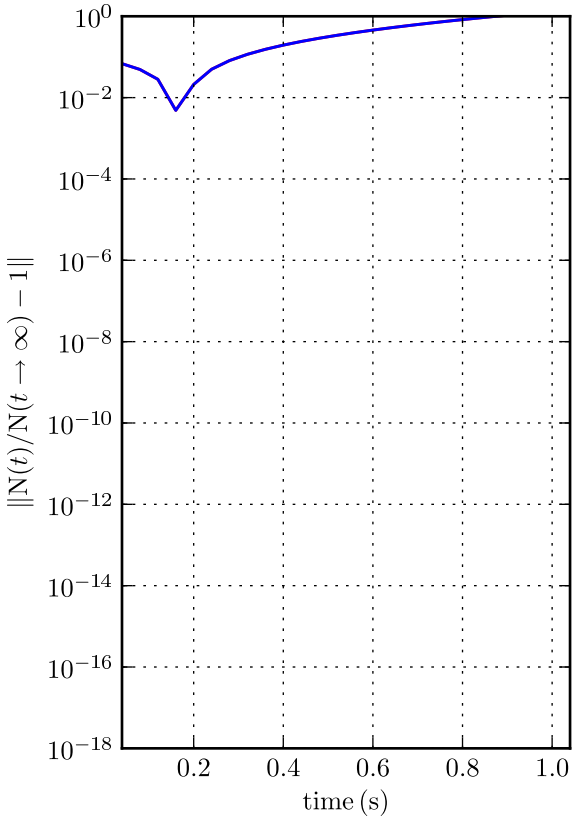


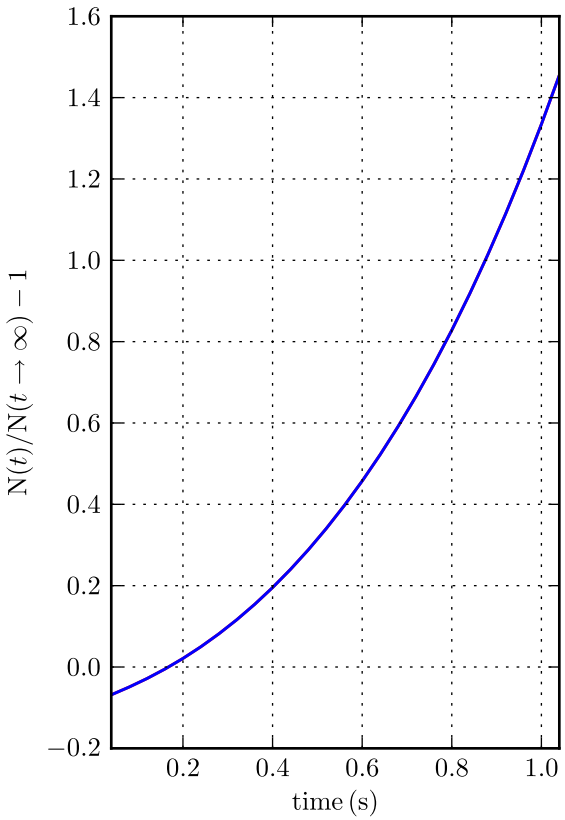


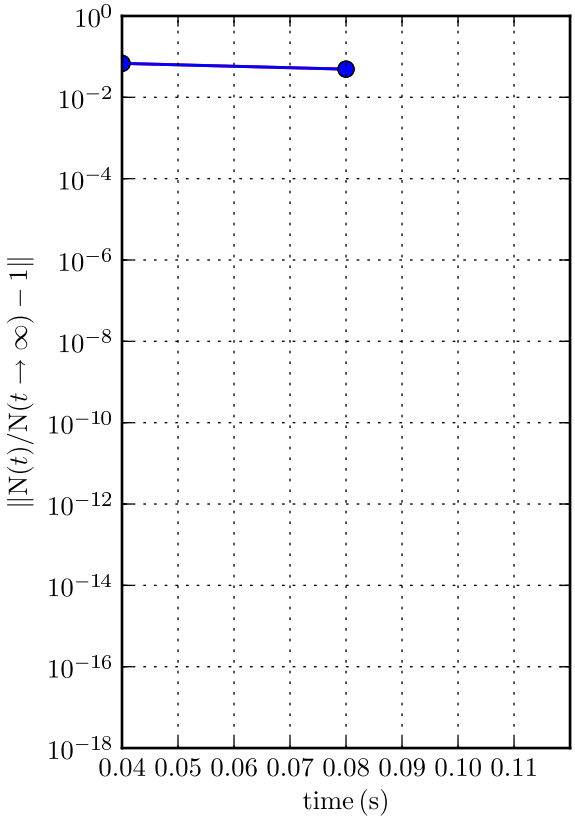
Particle conservation

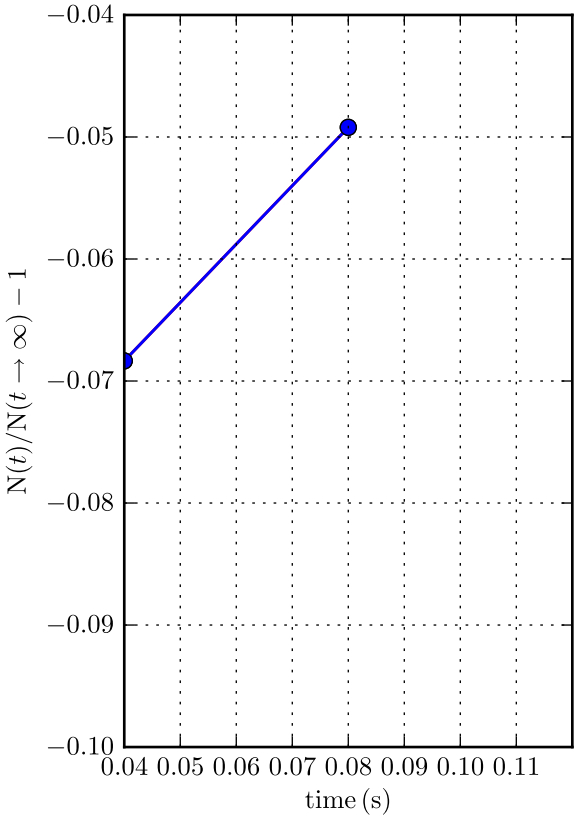
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution (electrons and ions); total time and zoom over time





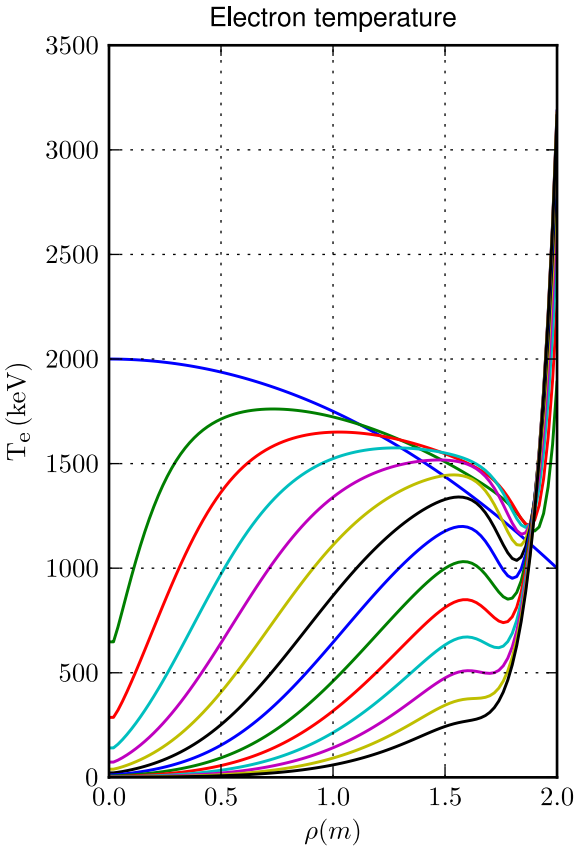


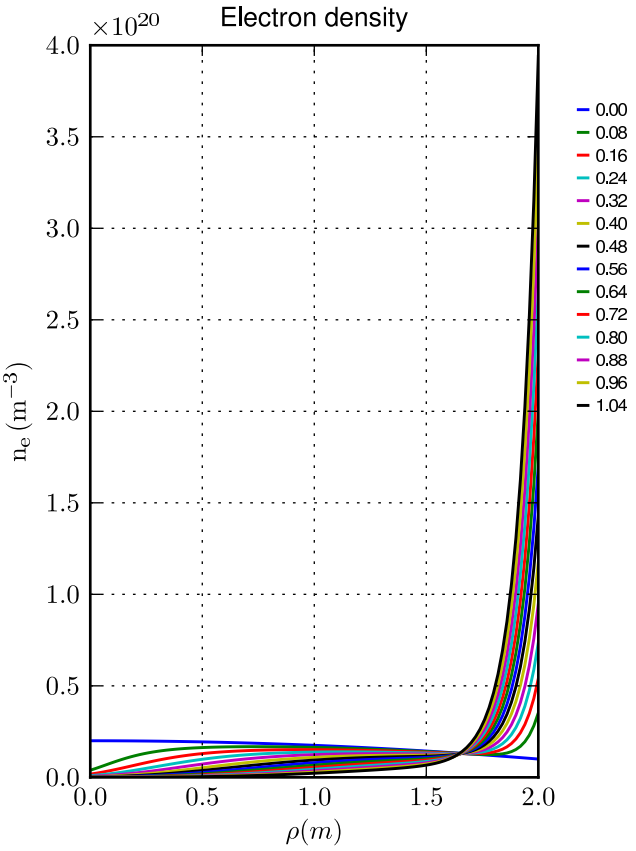


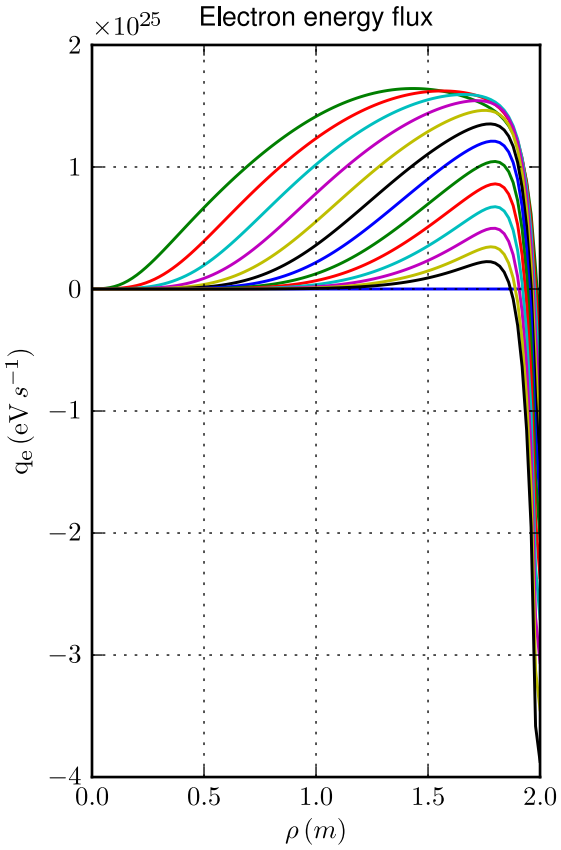
Profiles

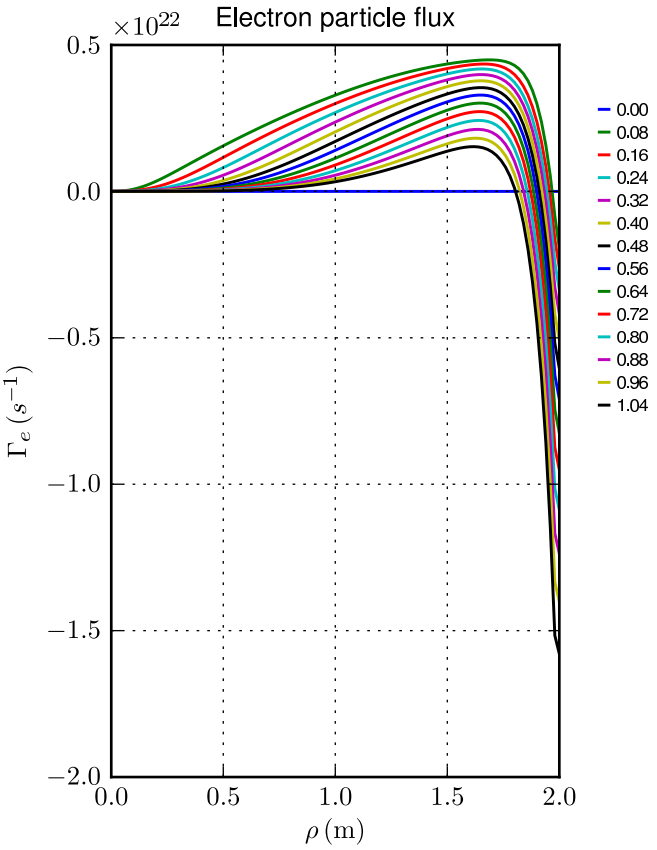
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: total simulation time/10







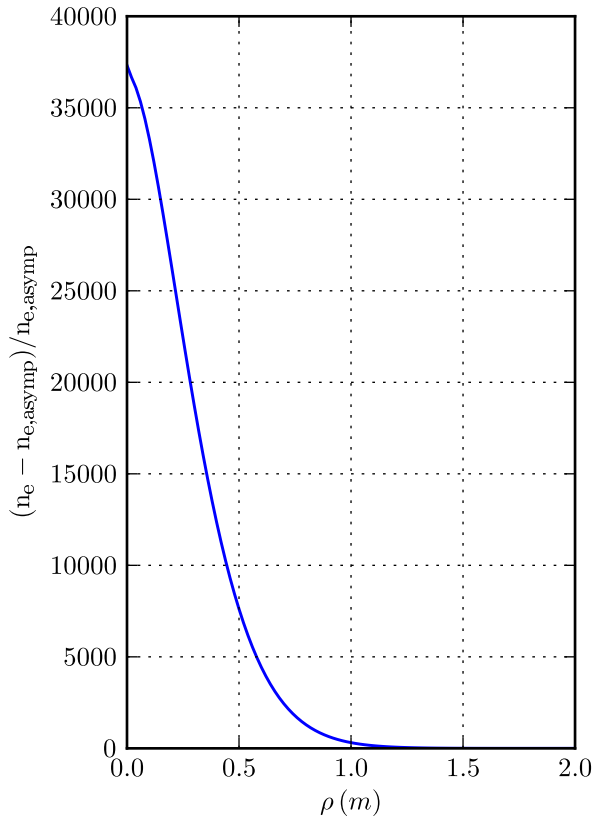


Profiles

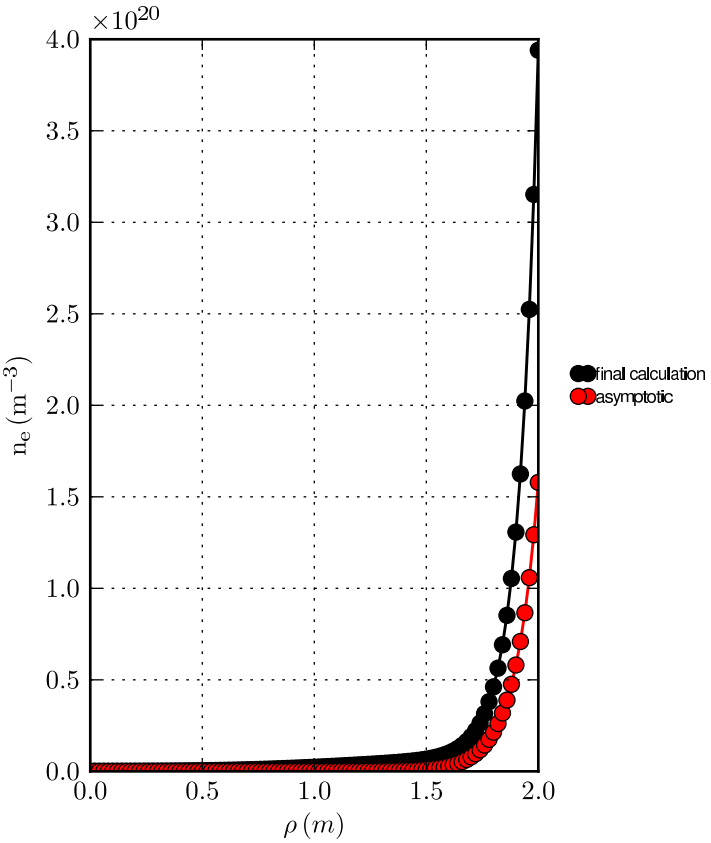
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution

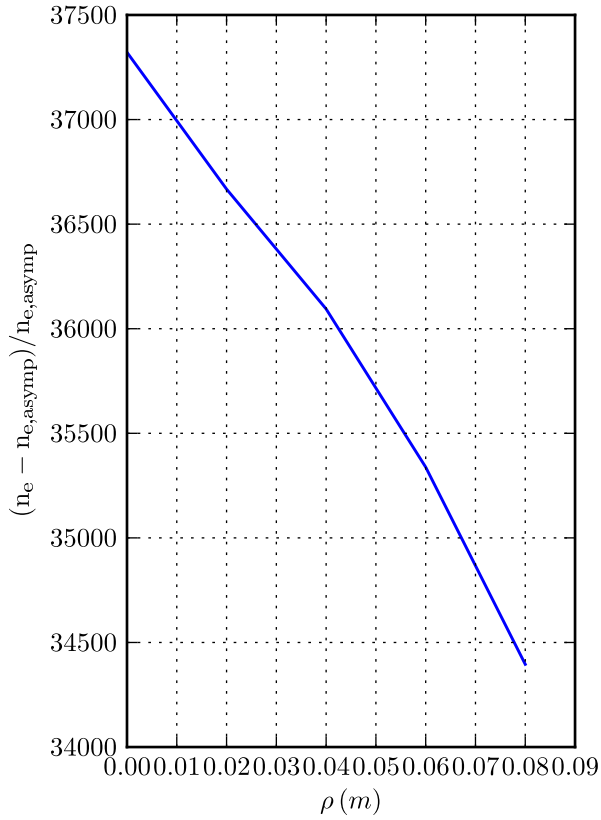
Electron density relative error



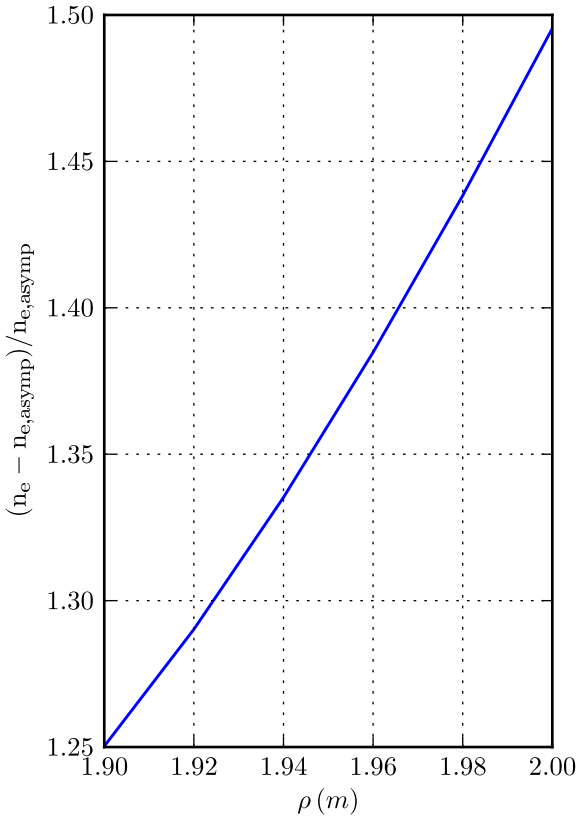
Electron density



Error: zoom over axis



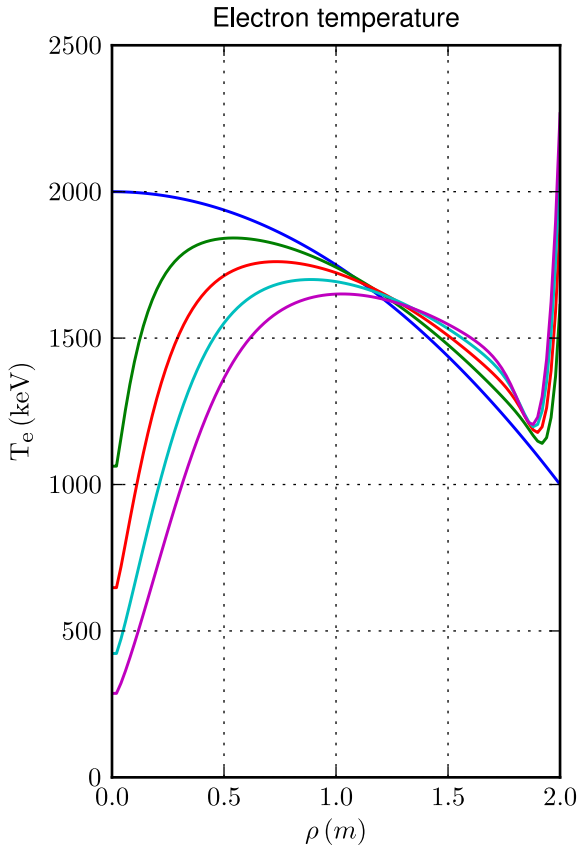
Error: zoom over edge

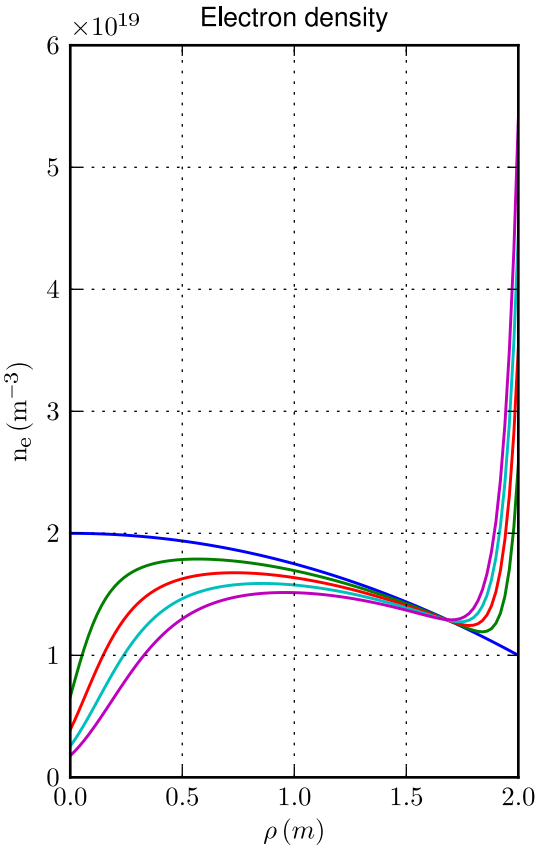


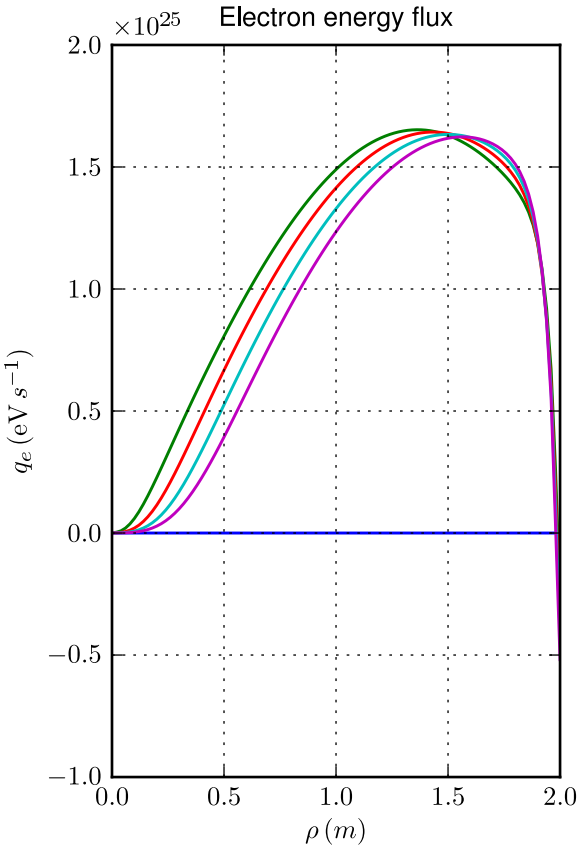
Profiles

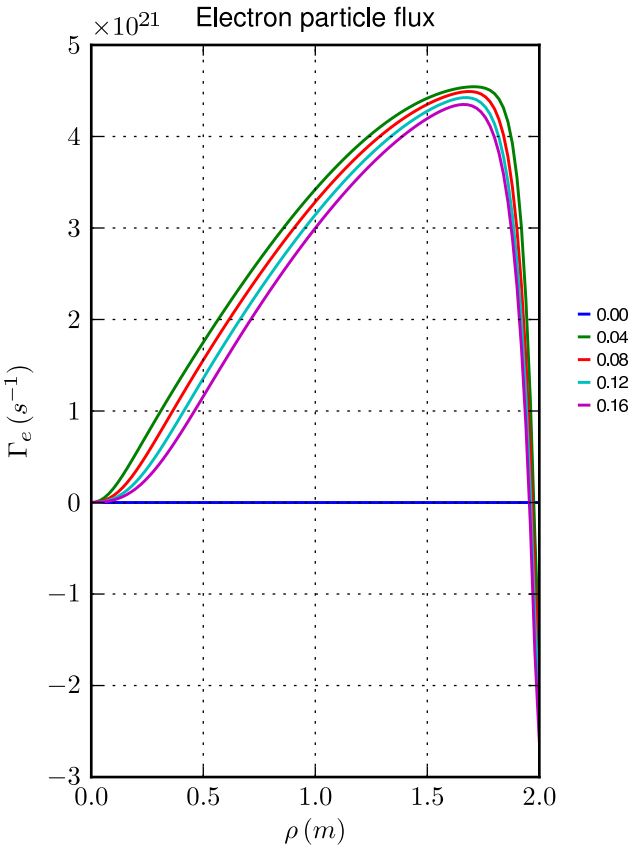
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







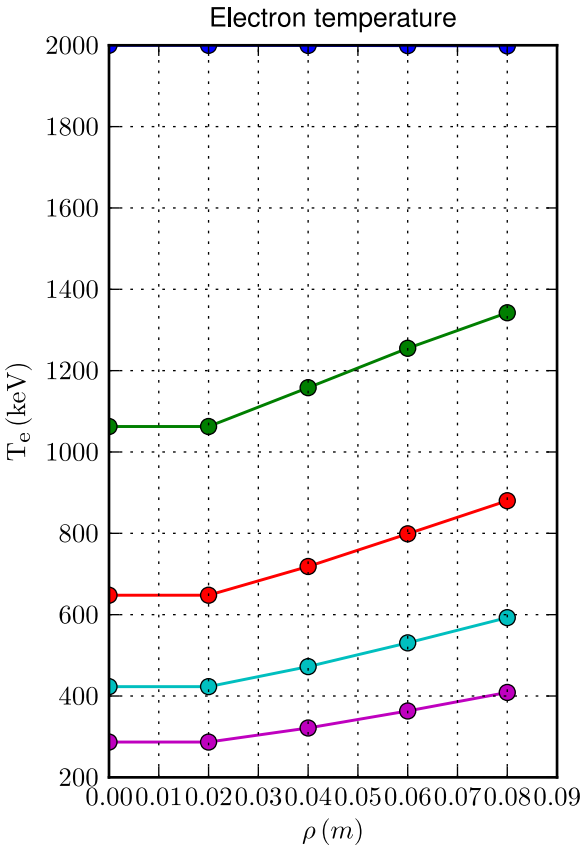


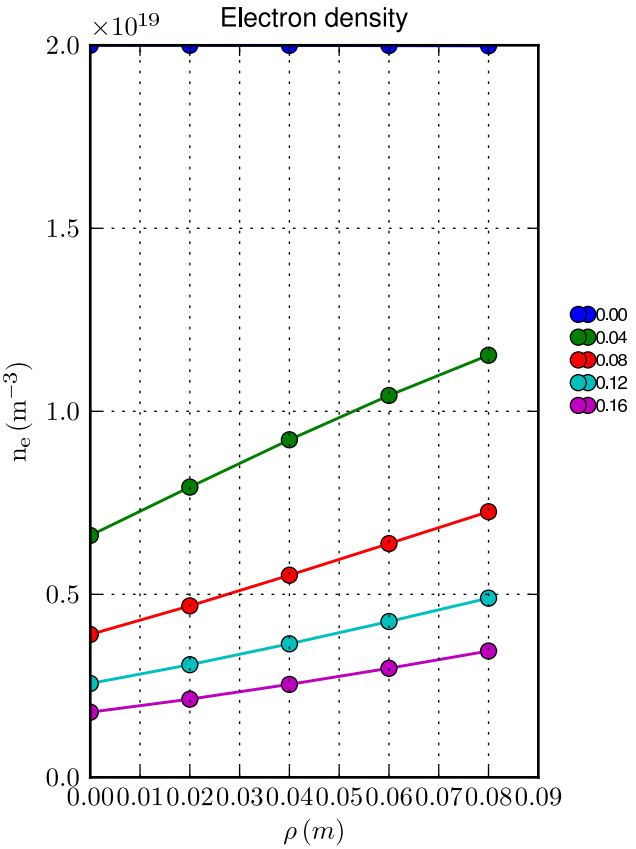
Profiles

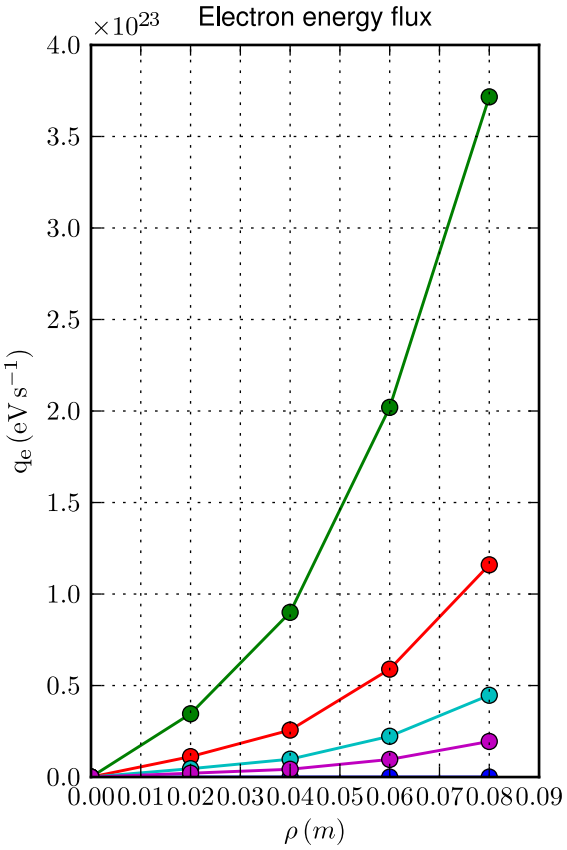
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

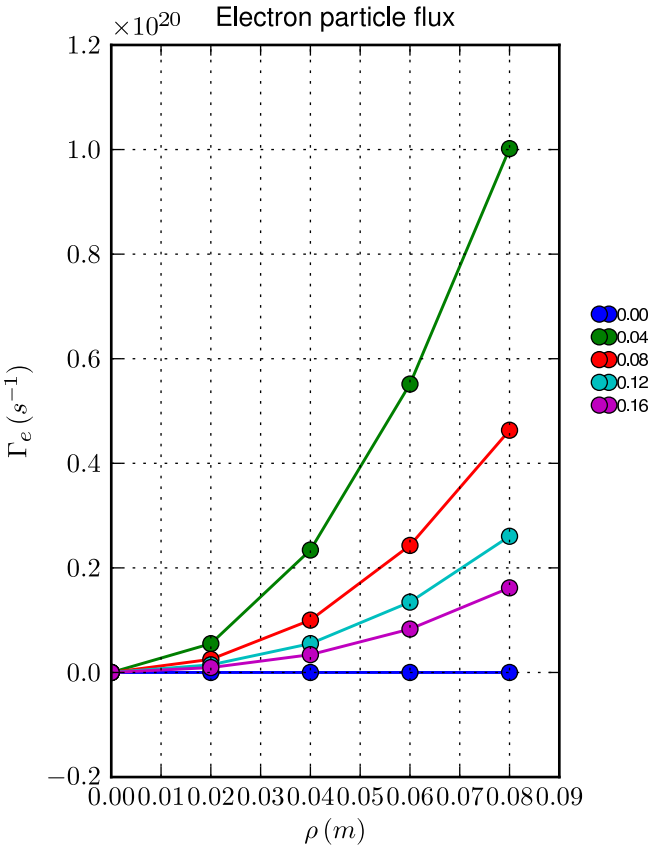
Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







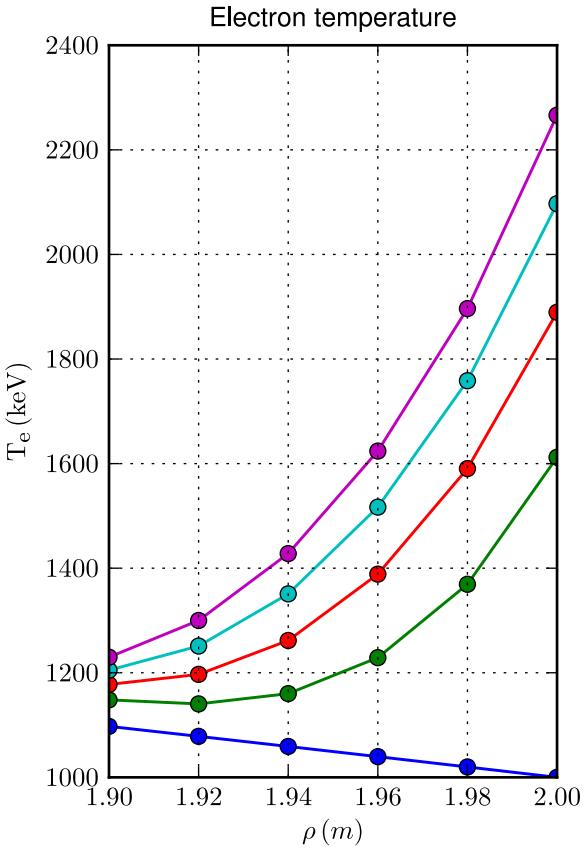


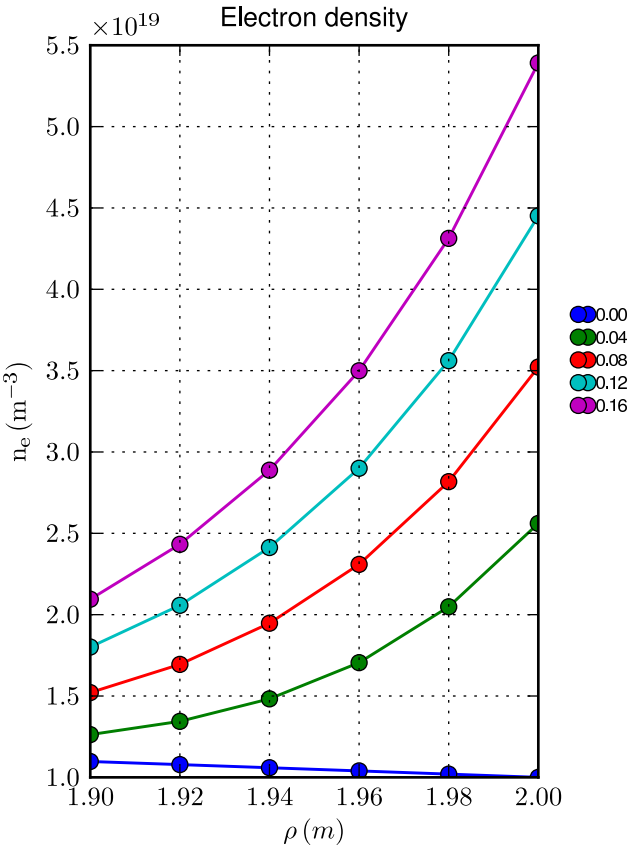
Profiles

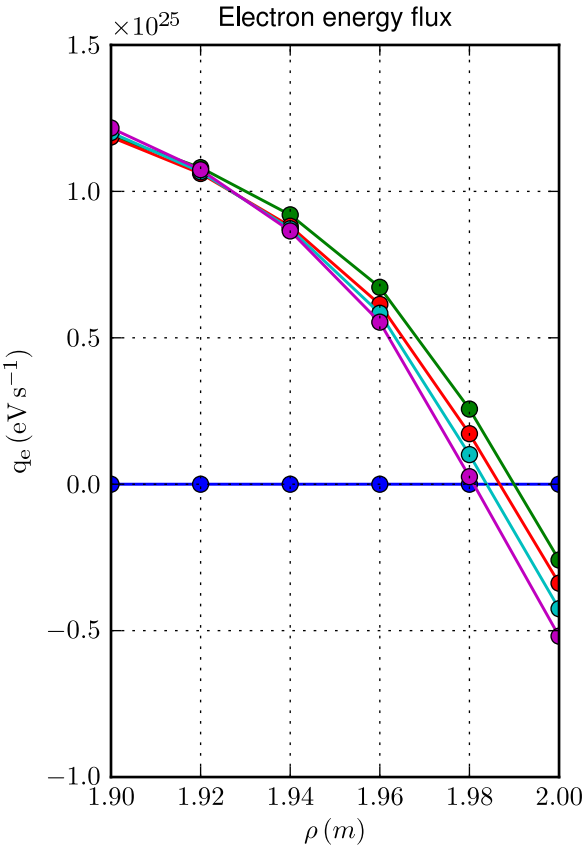
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

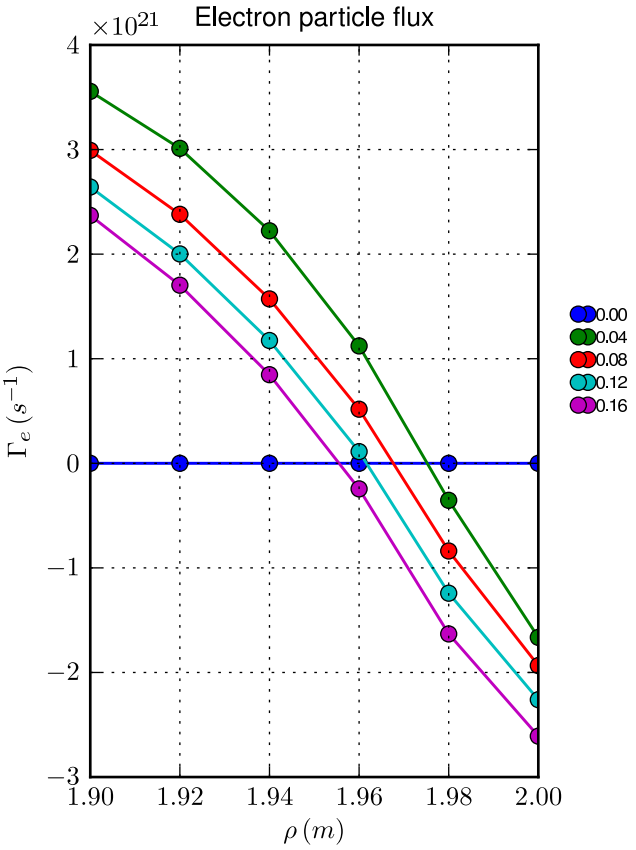
Spatial zoom over edge

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







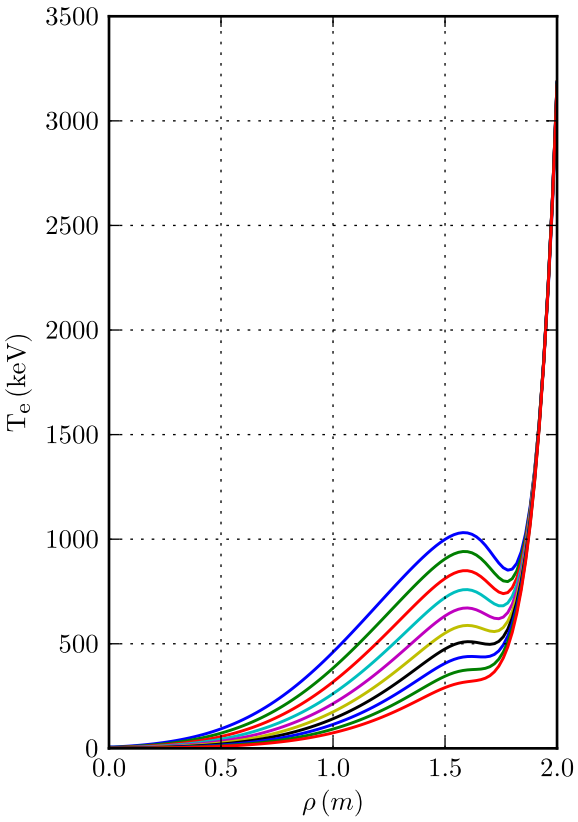


Profiles

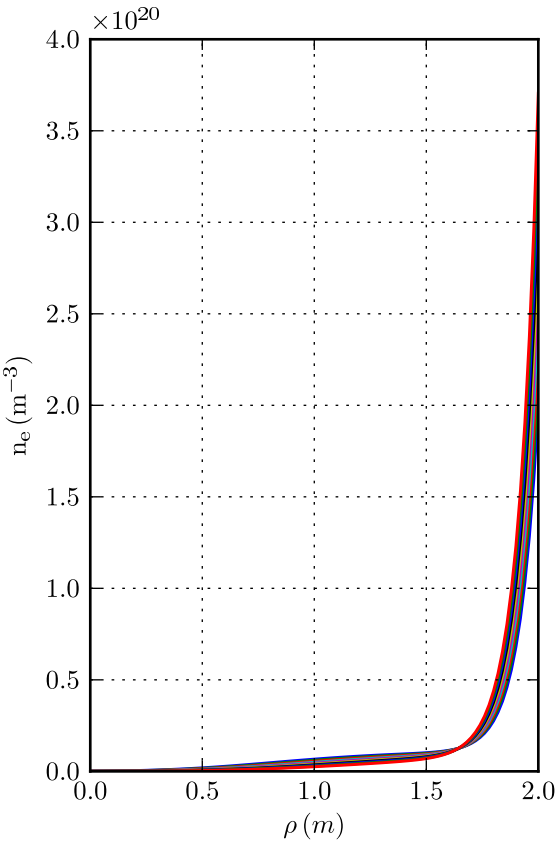
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: last 10 time slices

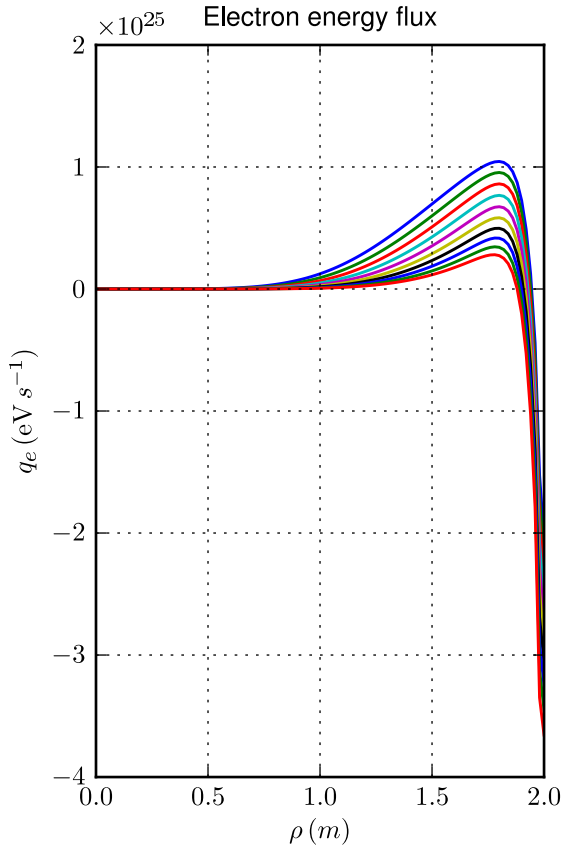
Electron temperature



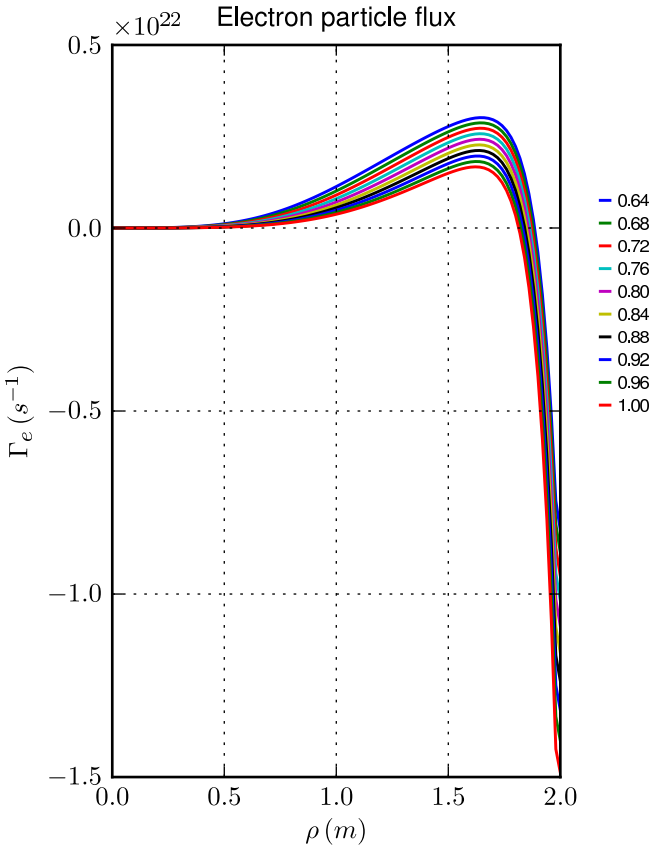
Electron density



Electron energy flux



Electron particle flux

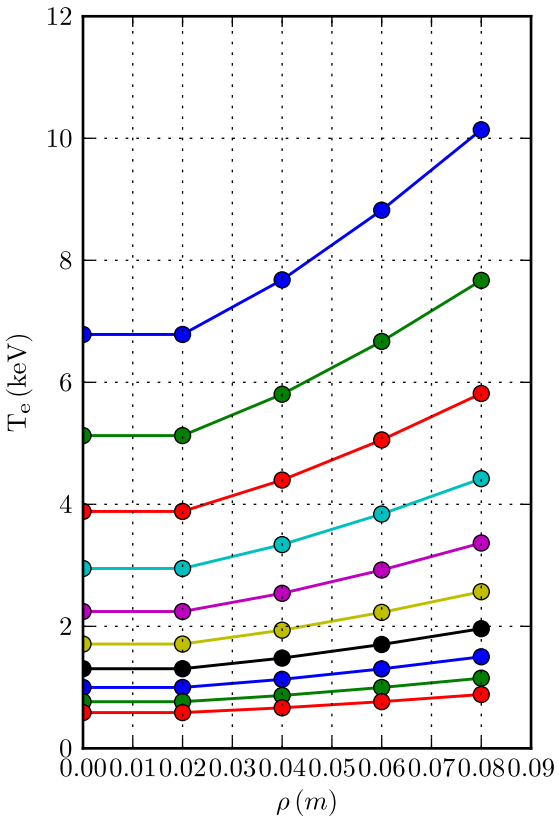


Profiles

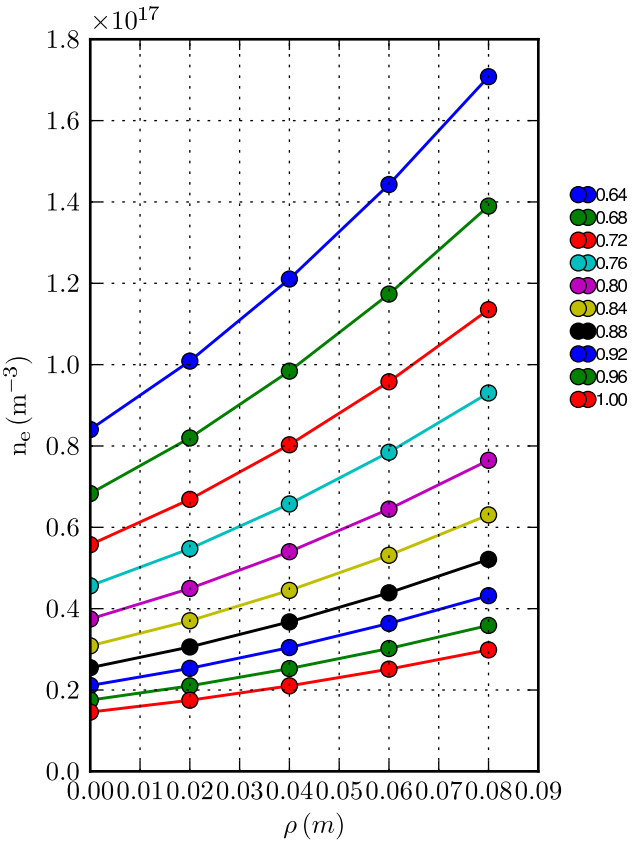
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Spatial zoom over magnetic axis; time sampling: last 10 time slices

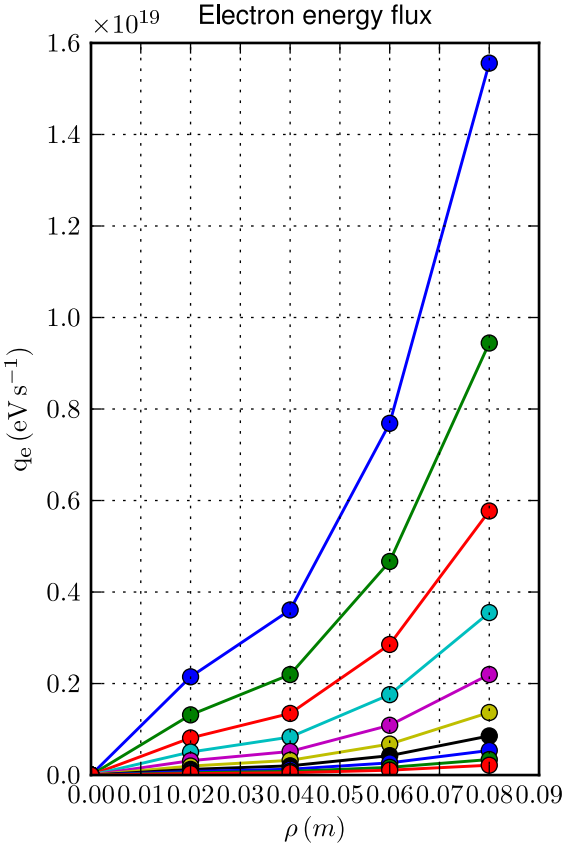
Electron temperature



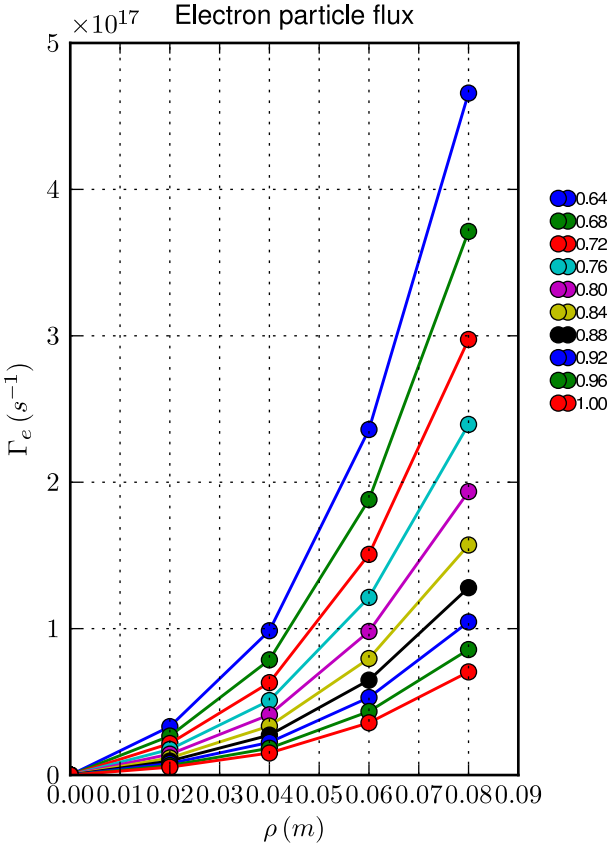
Electron density



Electron energy flux



Electron particle flux

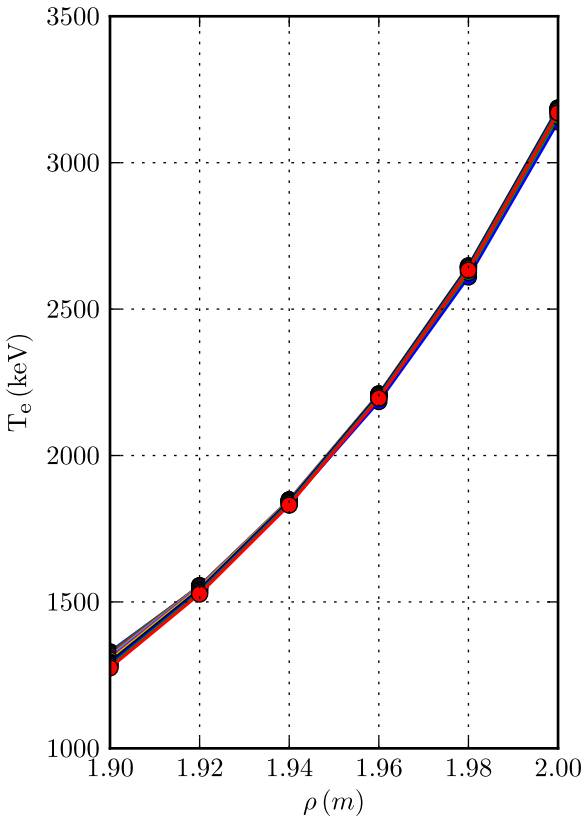


Profiles

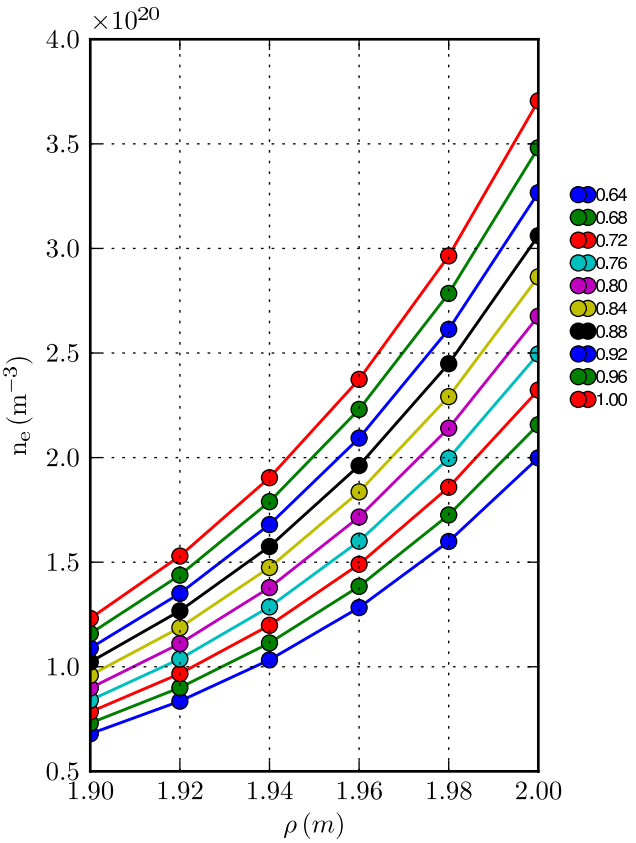
[Case: I.1.5.c, Solver: 3, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Spatial zoom over edge; time sampling: last 10 time slices

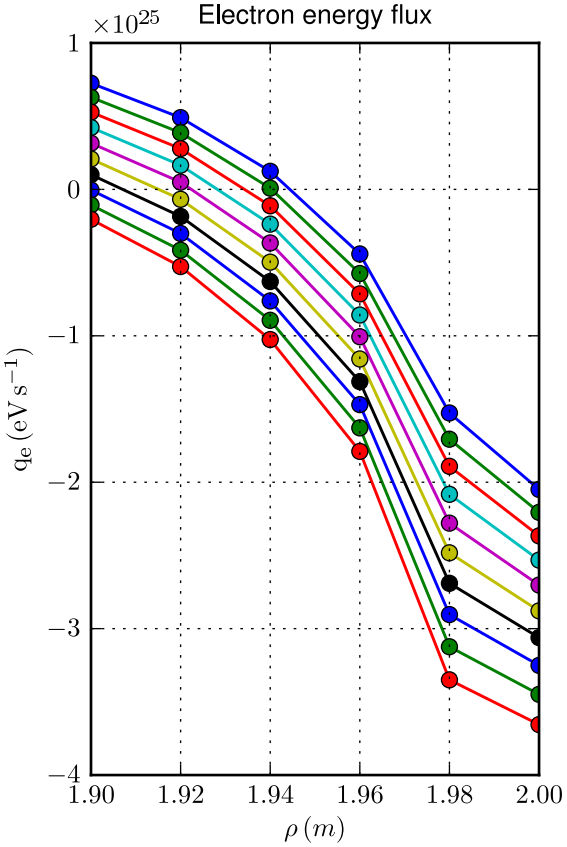
Electron temperature



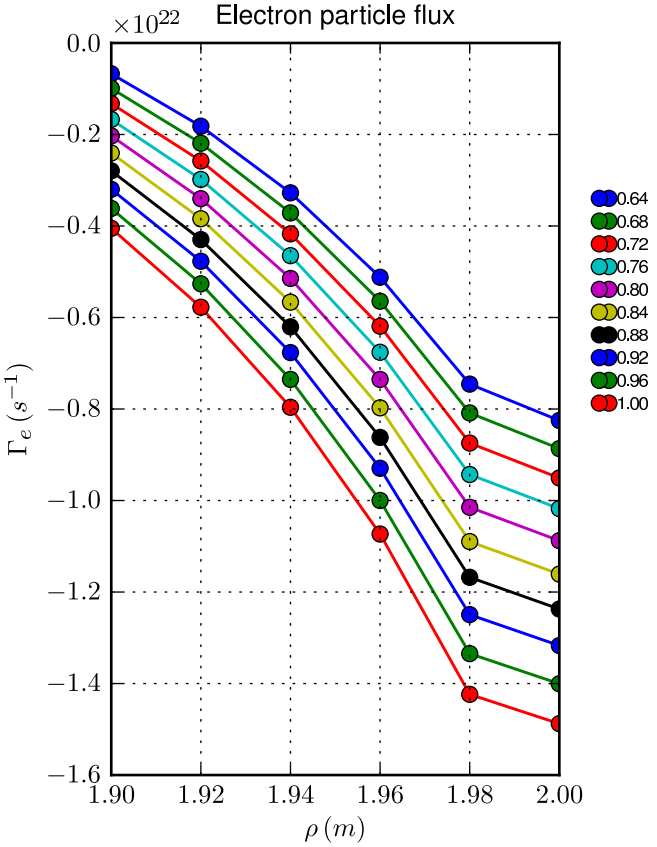
Electron density



Electron energy flux



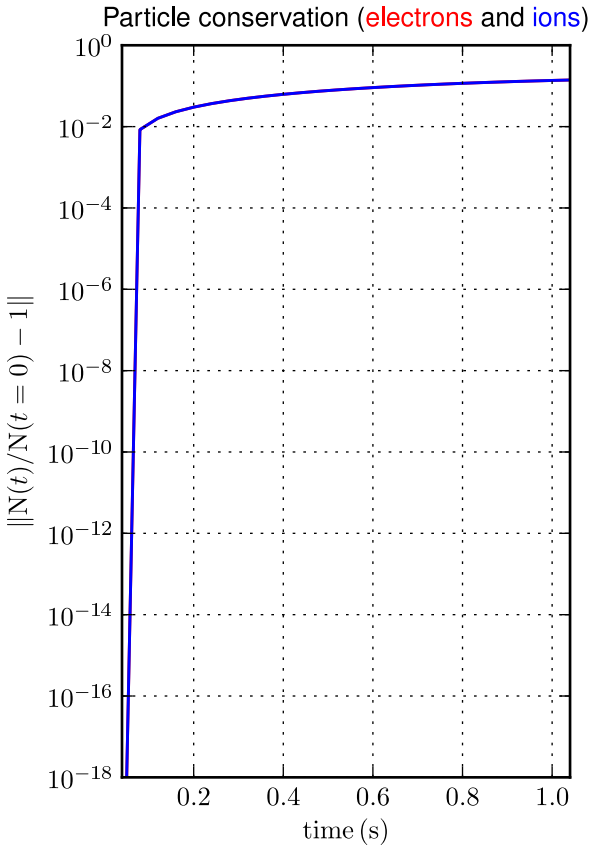
Electron particle flux

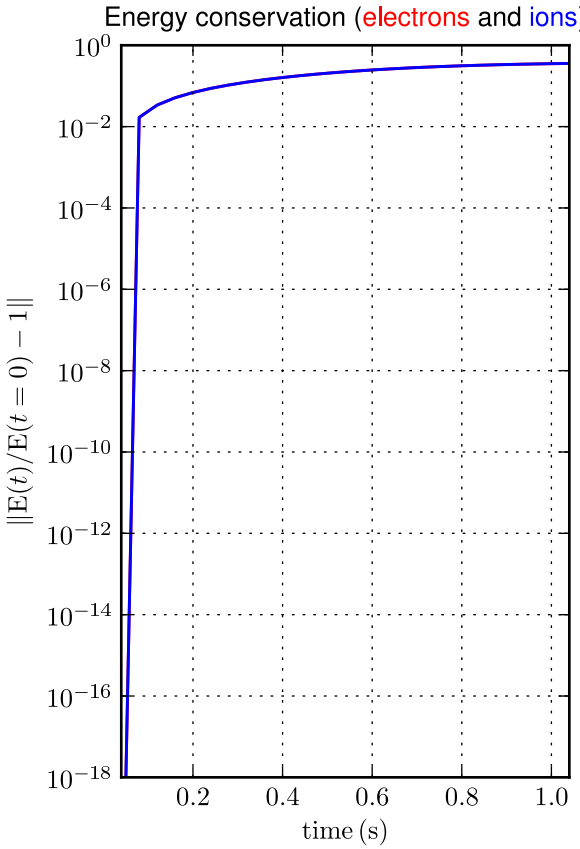


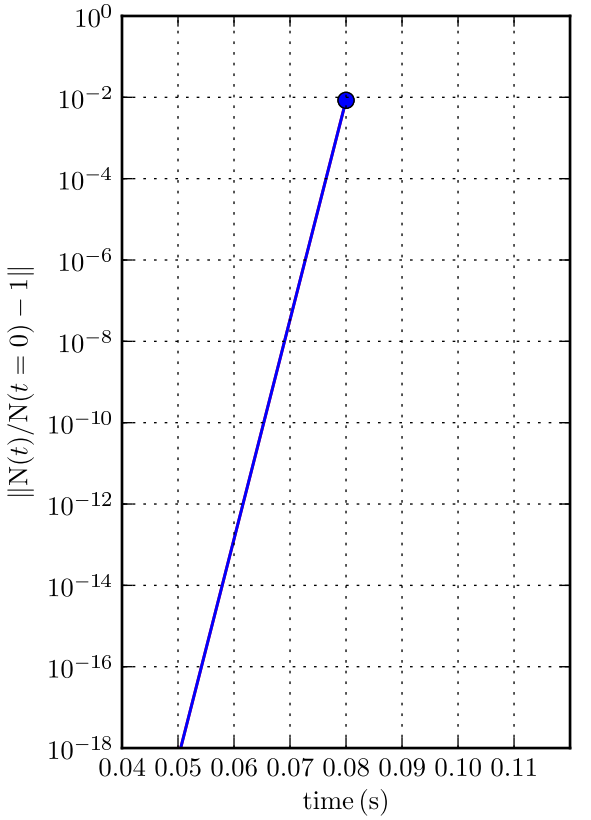
Part. & Energy conservation

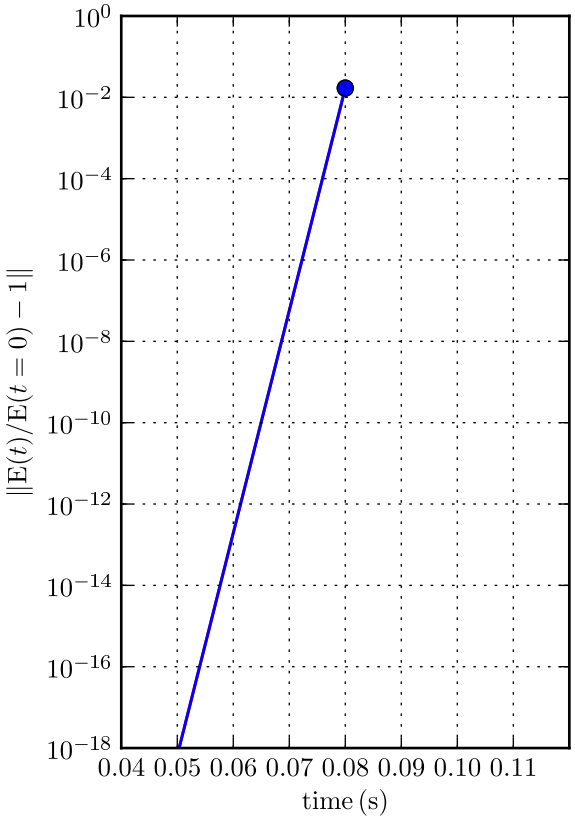
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - log scale; total time and zoom over time





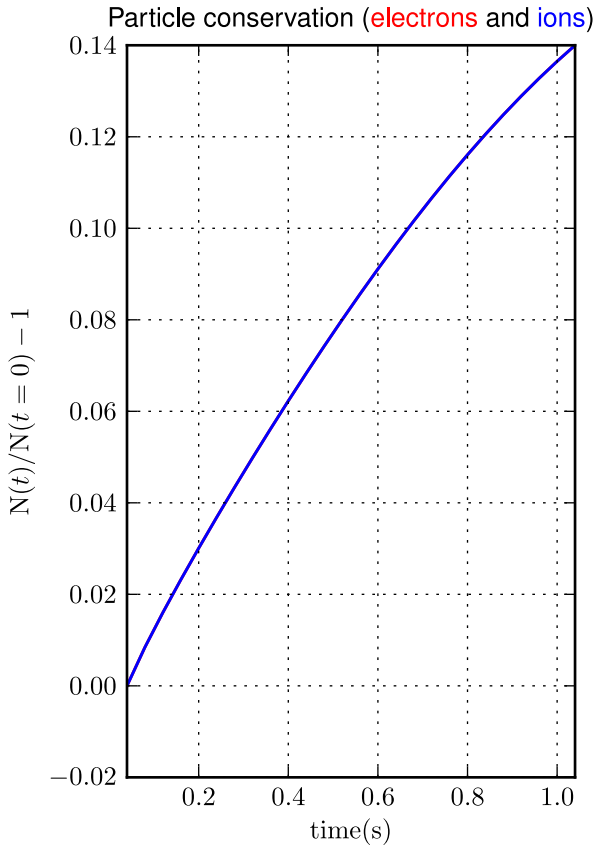


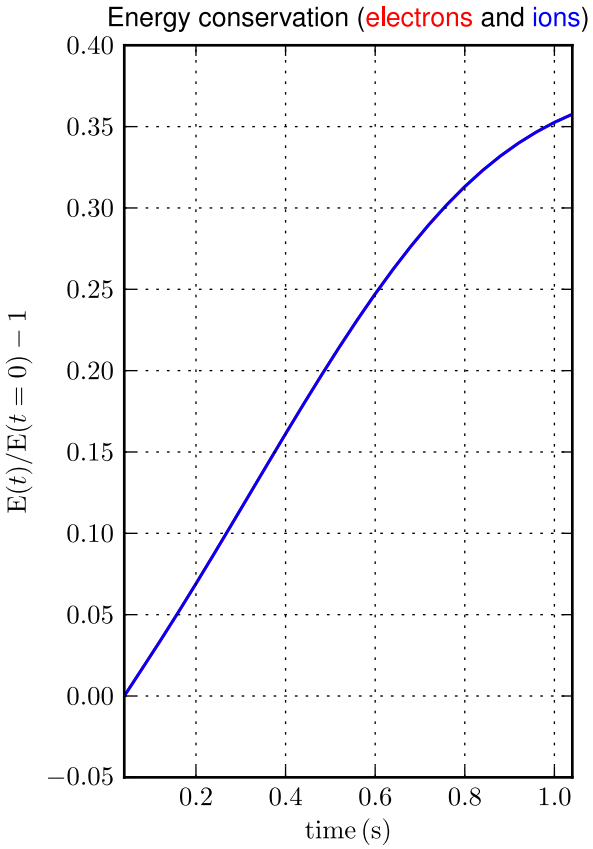


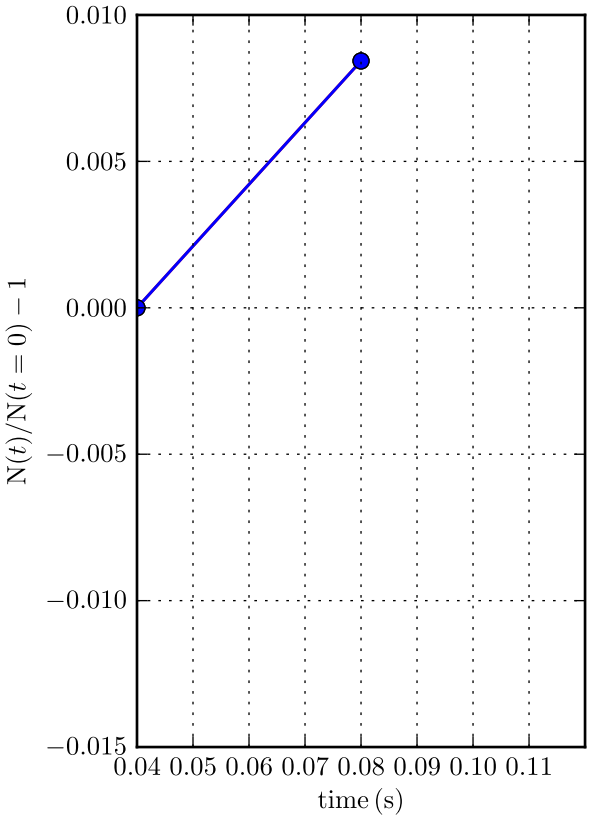
Part. & Energy conservation

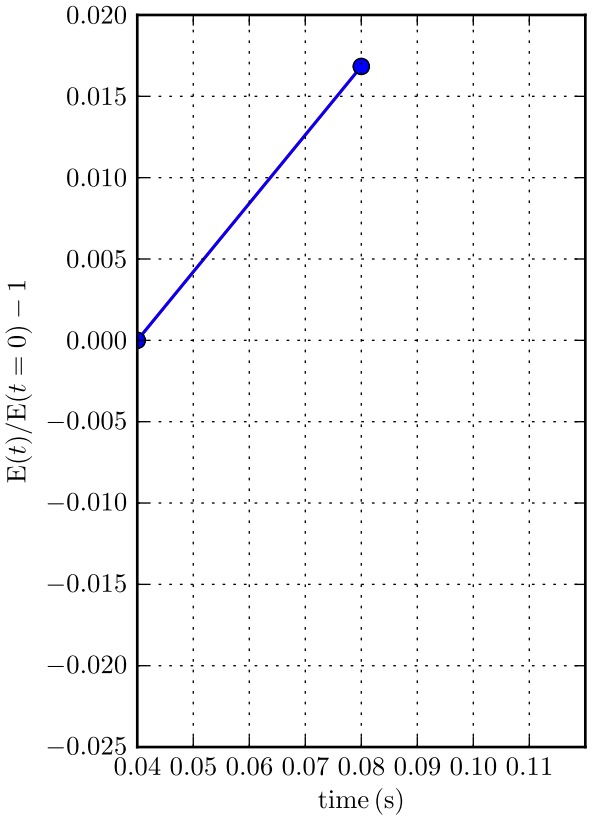
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - linear scale; total time and zoom over time







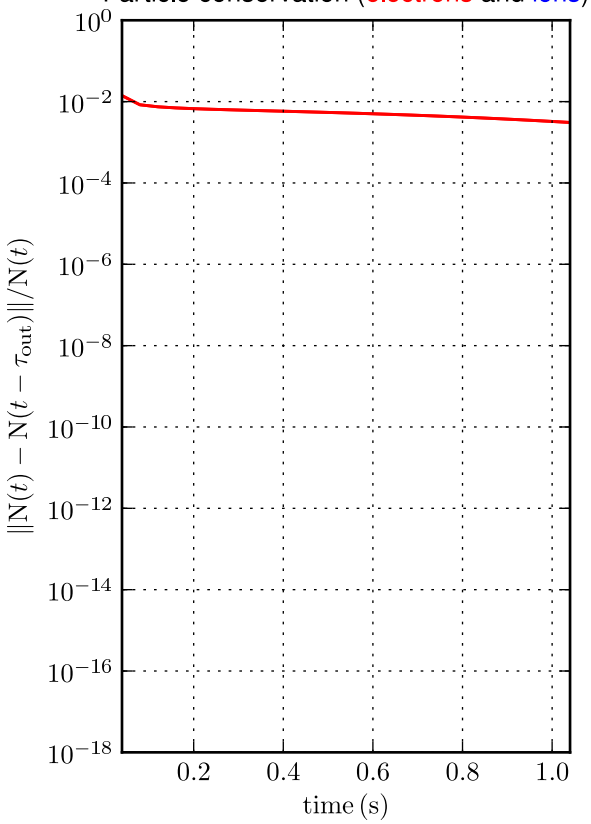


Part. & Energy conservation

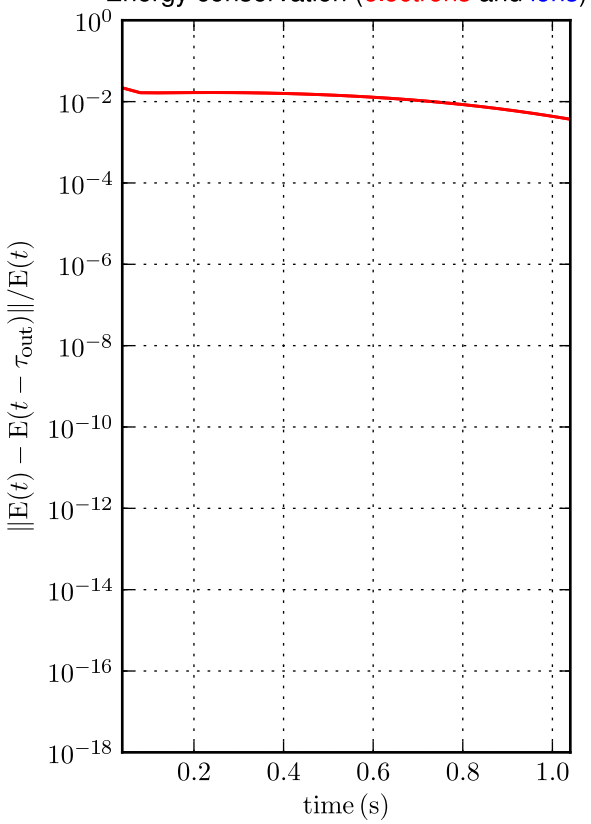
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

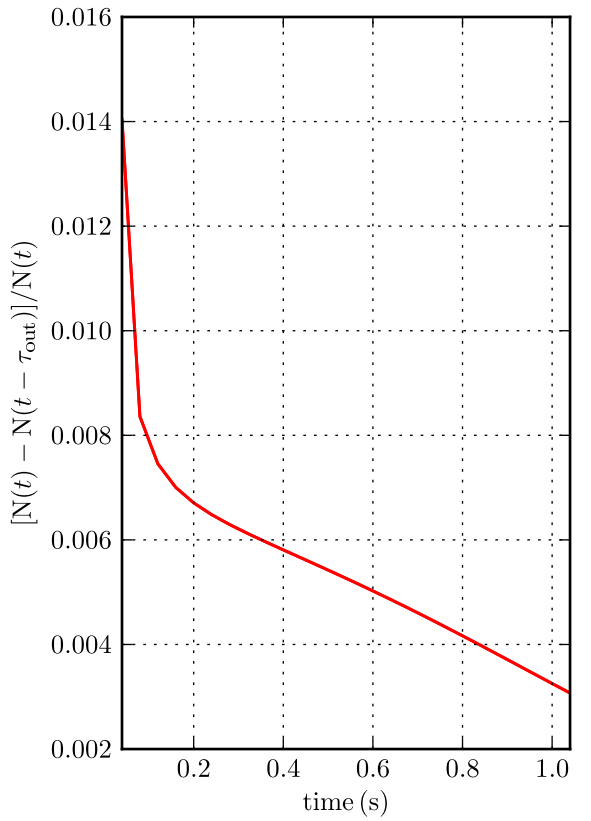
Comparison with previous time-sampled (τ_{out}) solution - log and linear scales

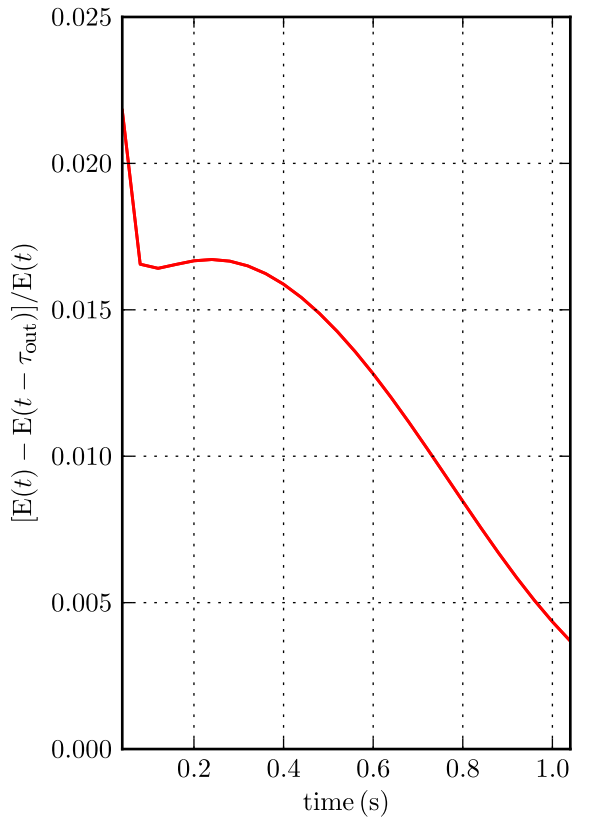
Particle conservation (electrons and ions)



Energy conservation (electrons and ions)



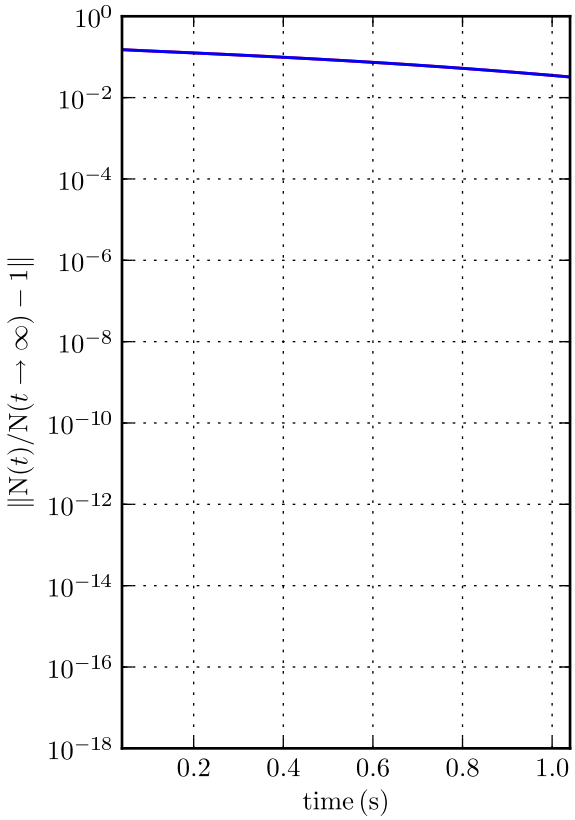


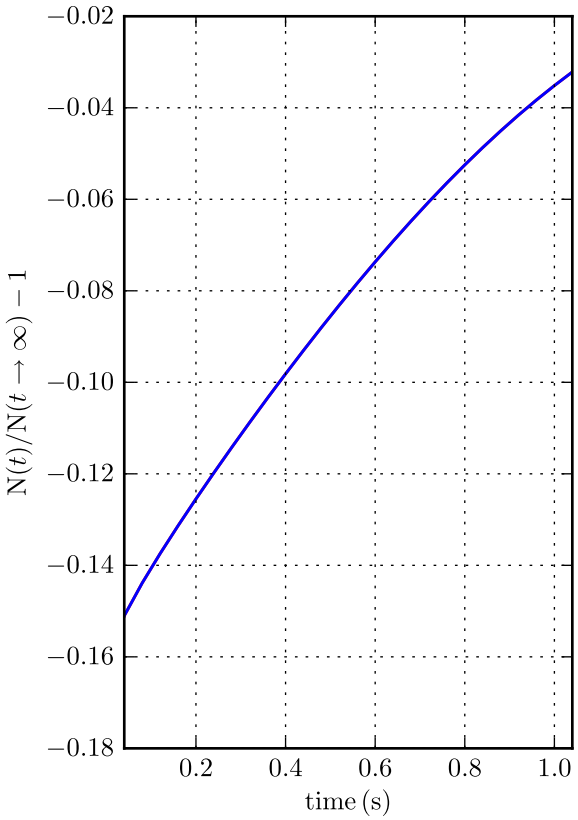


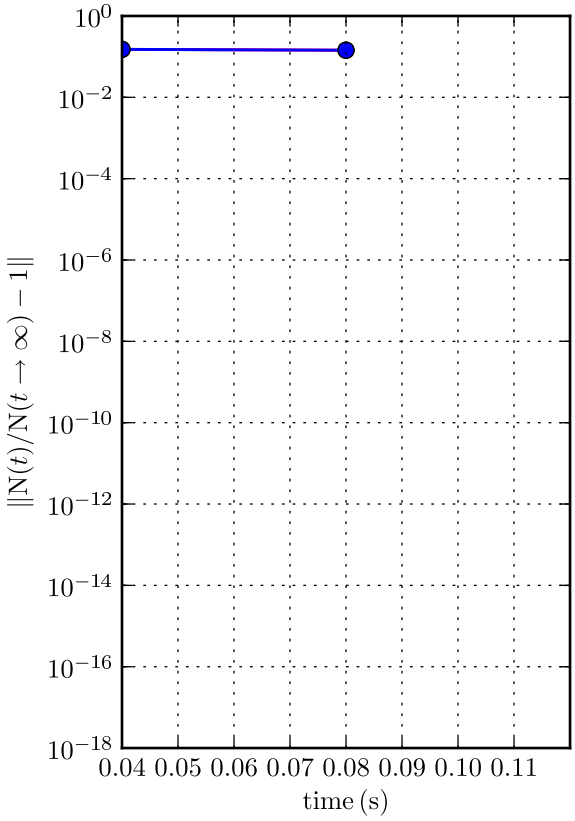
Particle conservation

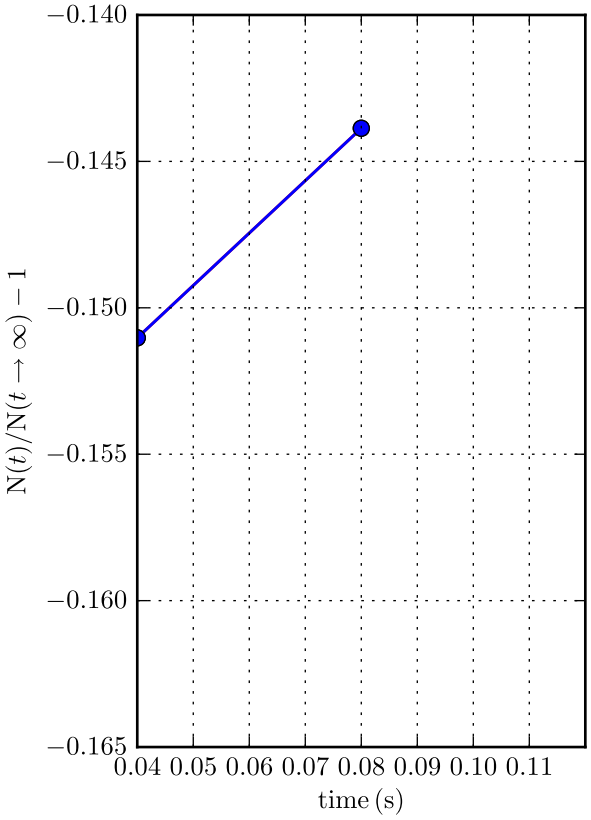
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution (electrons and ions); total time and zoom over time





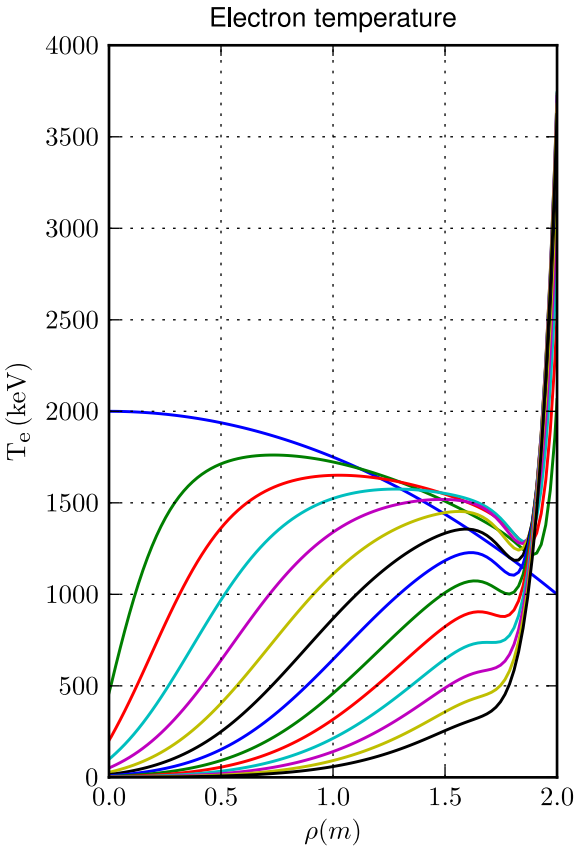


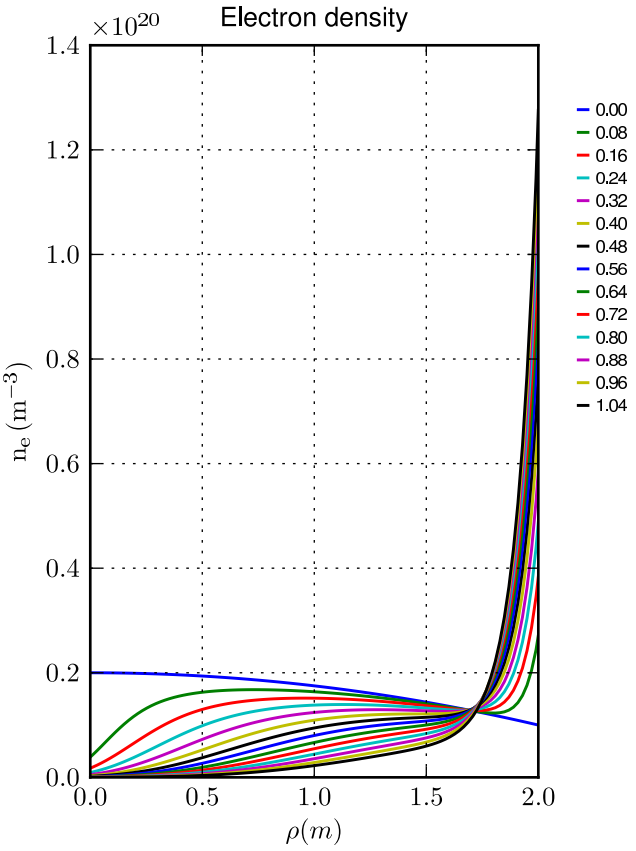


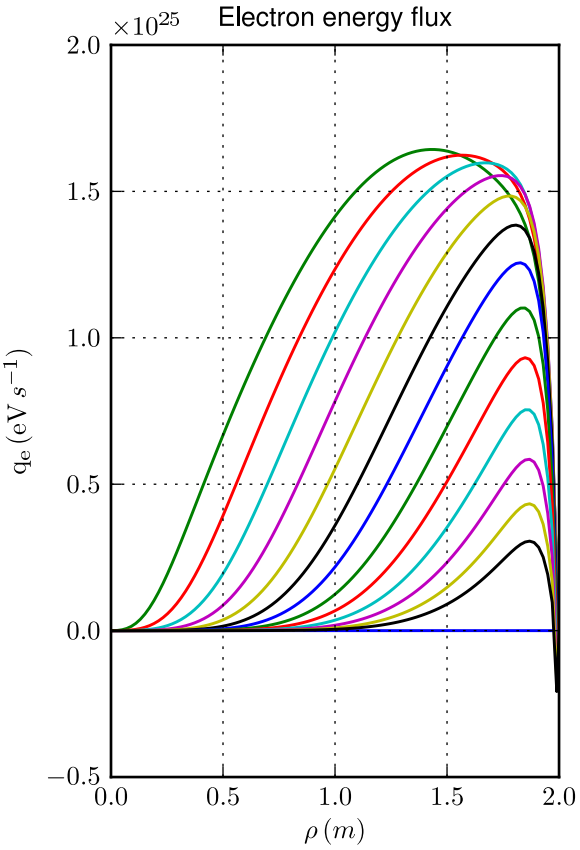
Profiles

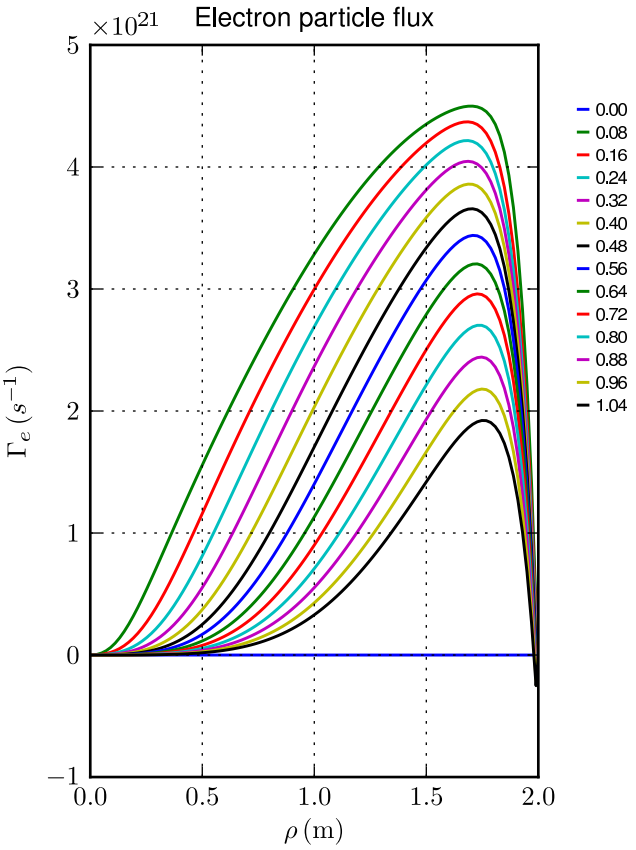
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: total simulation time/10







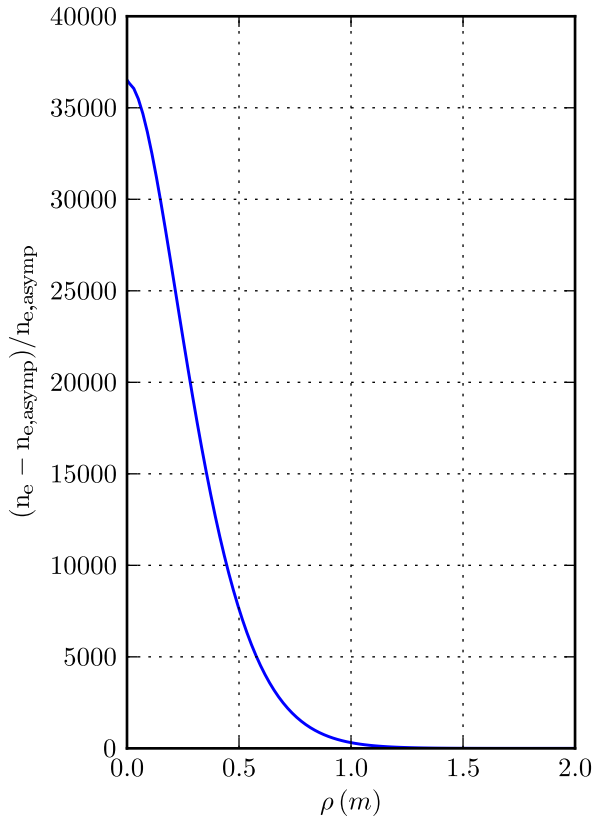


Profiles

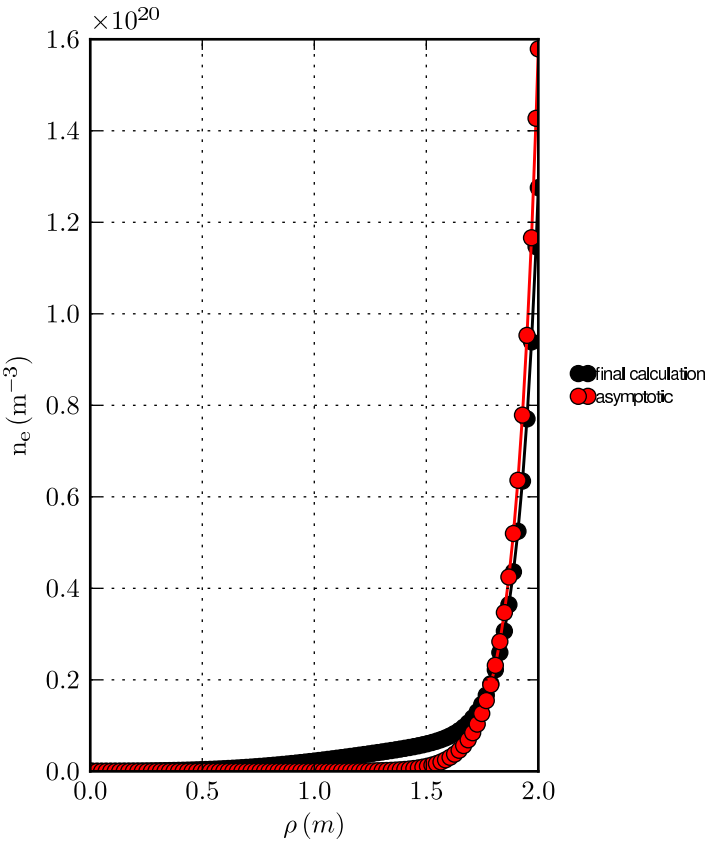
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution

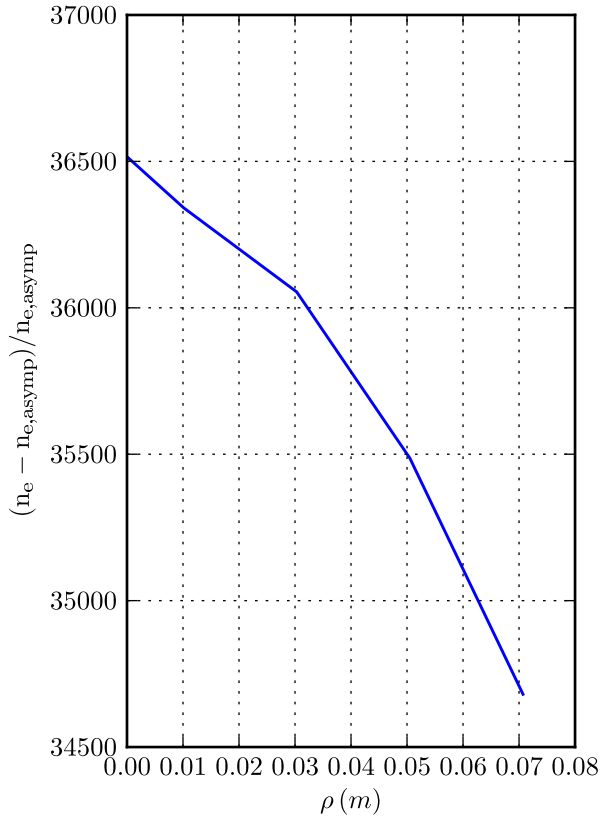
Electron density relative error



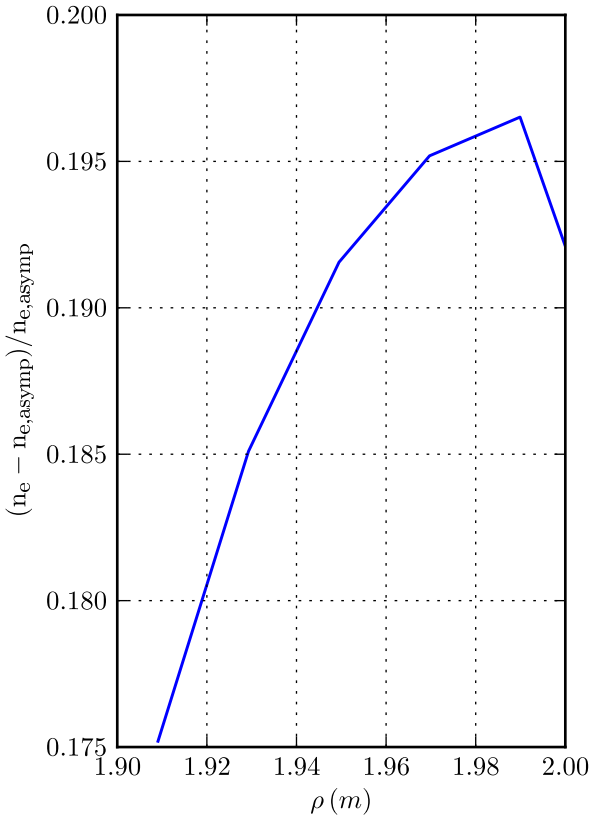
Electron density



Error: zoom over axis



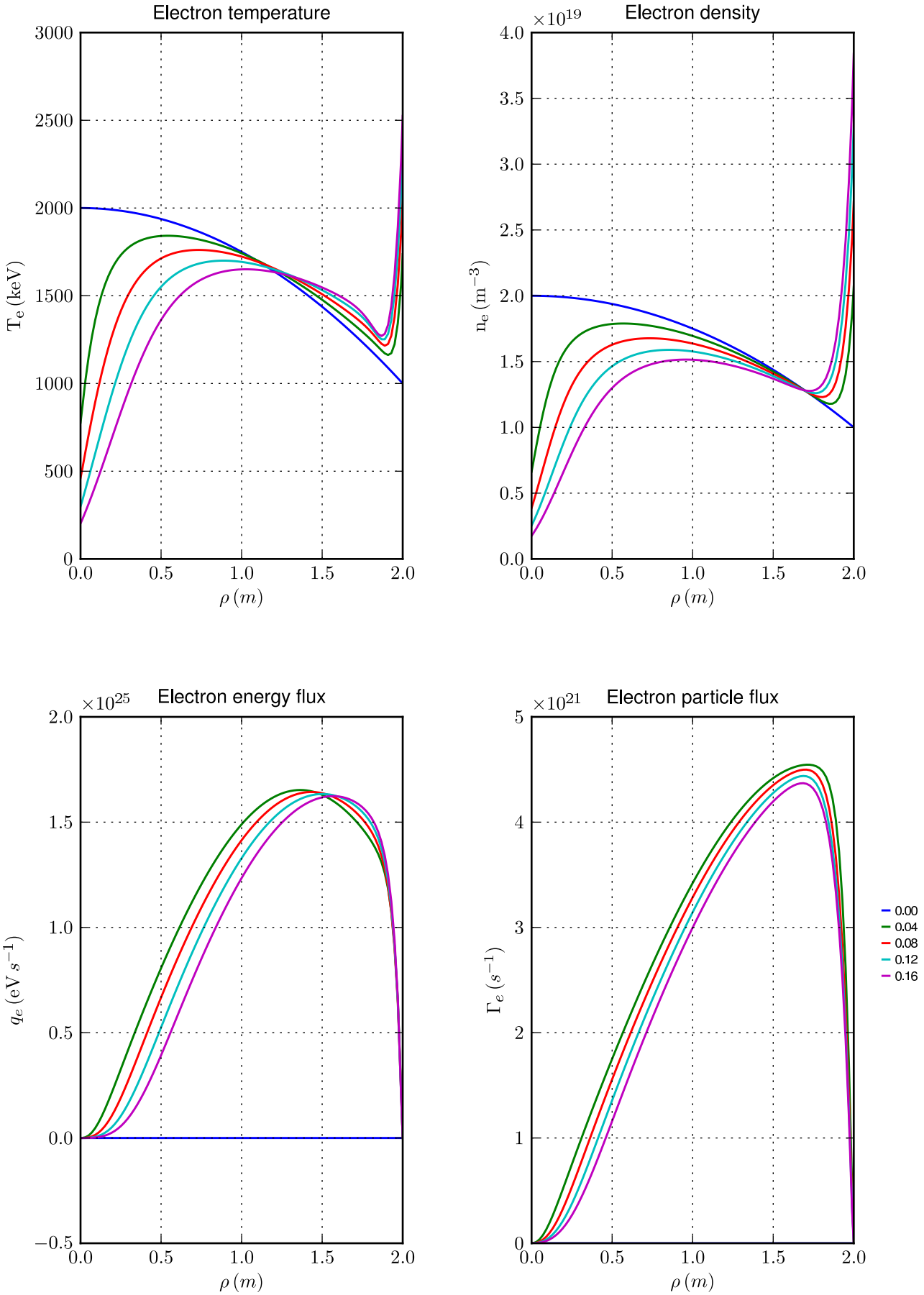
Error: zoom over edge



Profiles

[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s

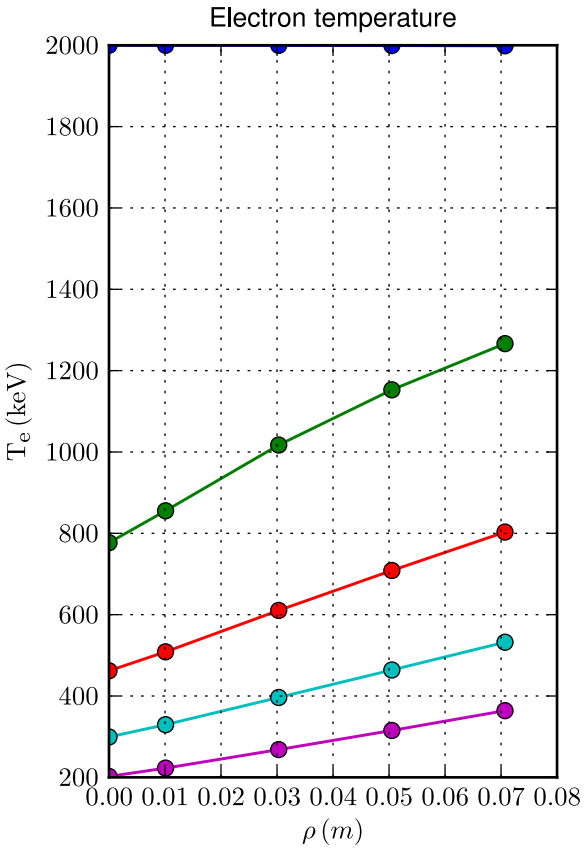


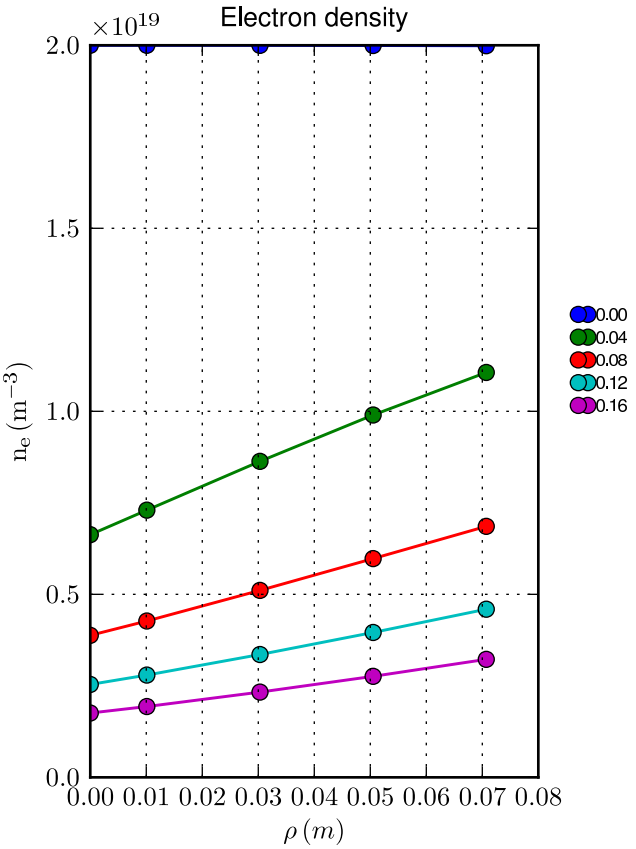
Profiles

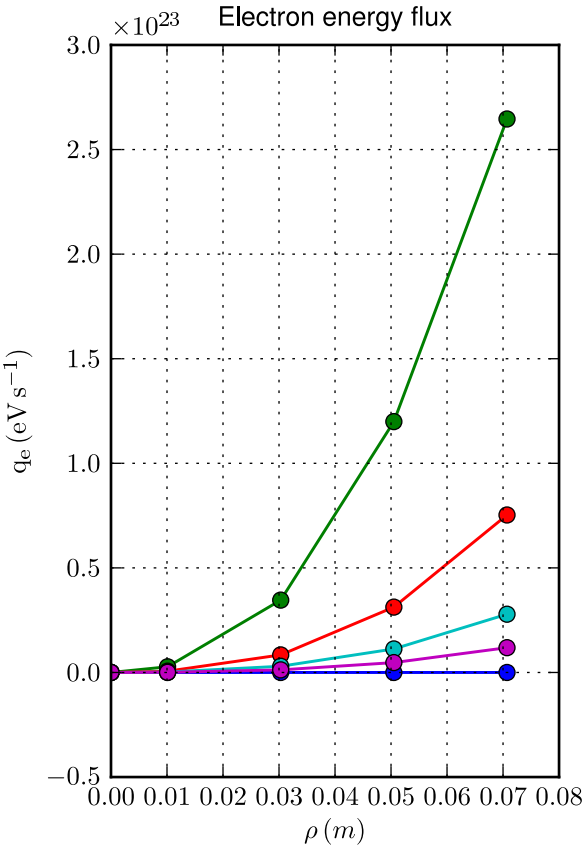
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

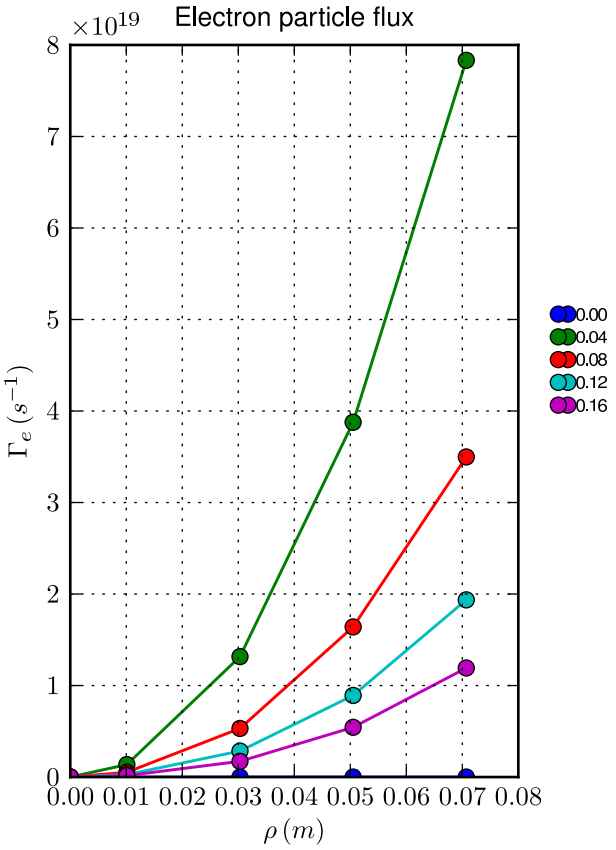
Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







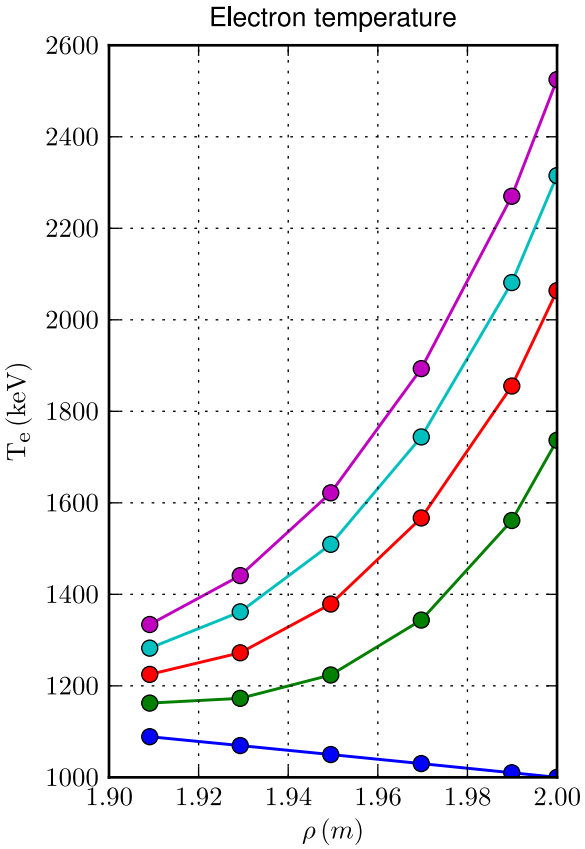


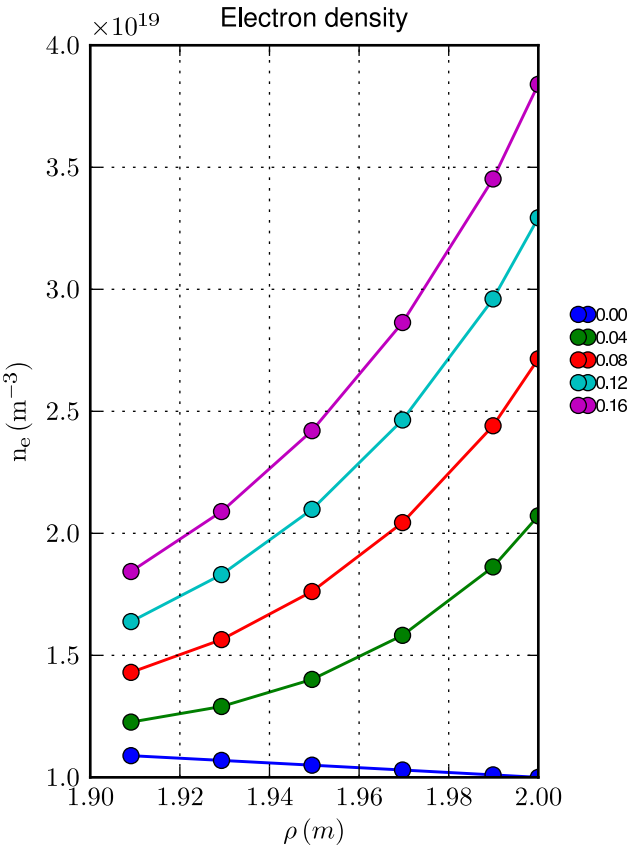
Profiles

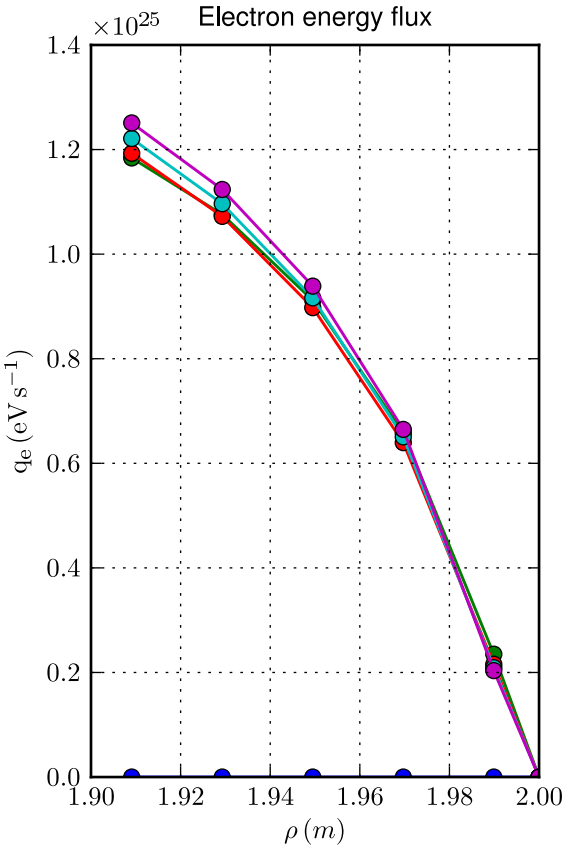
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

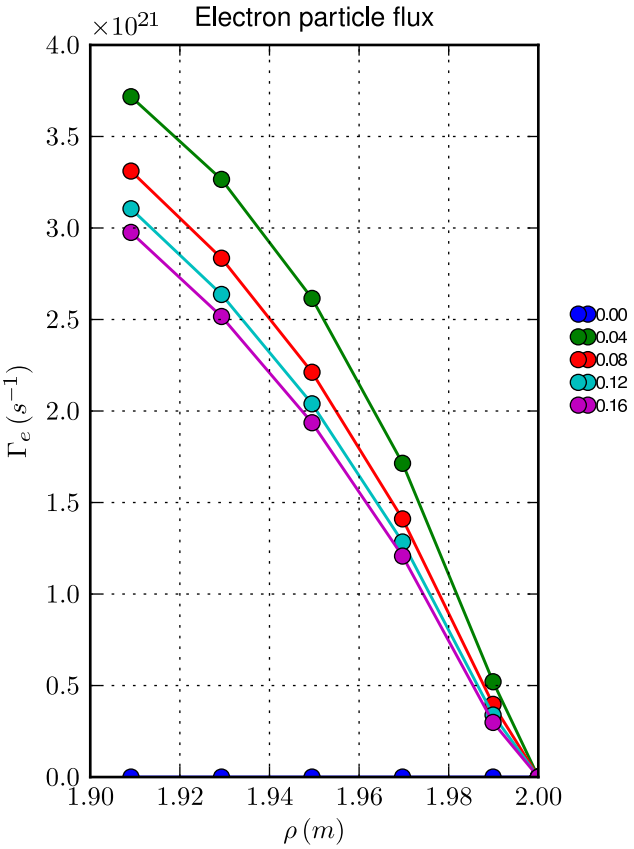
Spatial zoom over edge

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







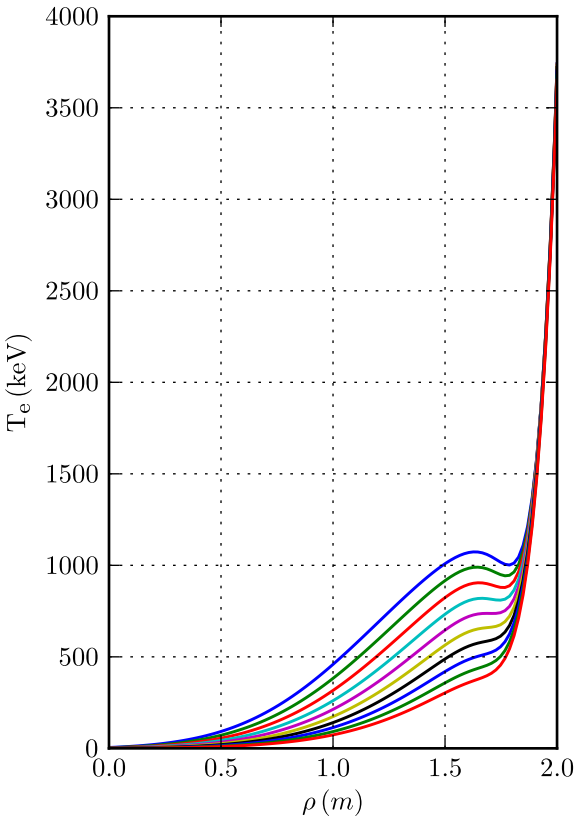


Profiles

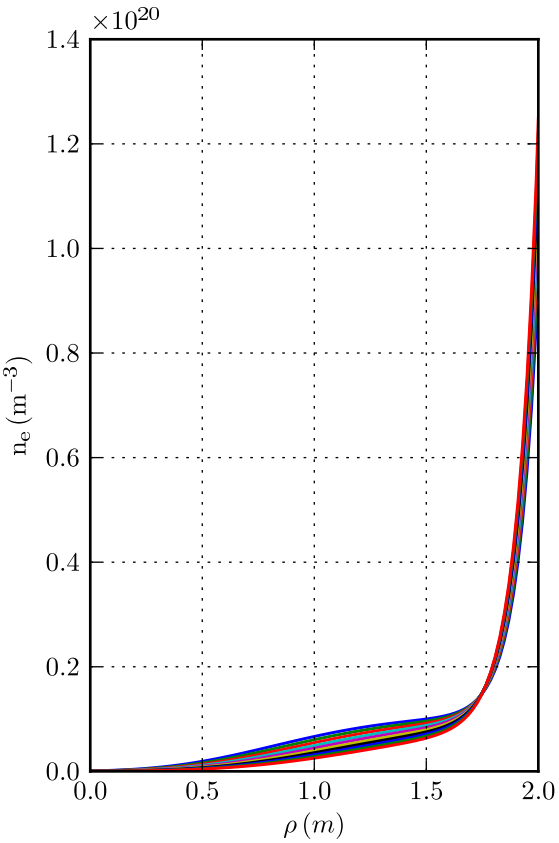
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: last 10 time slices

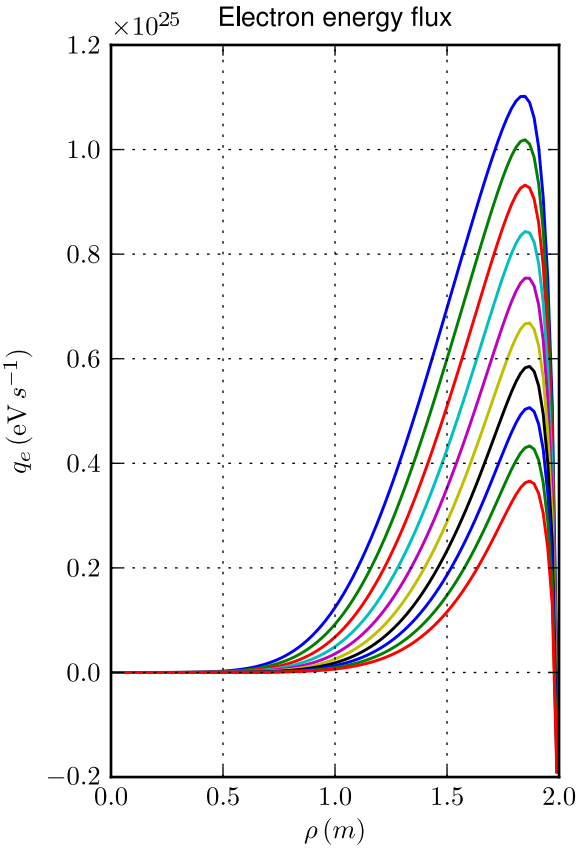
Electron temperature



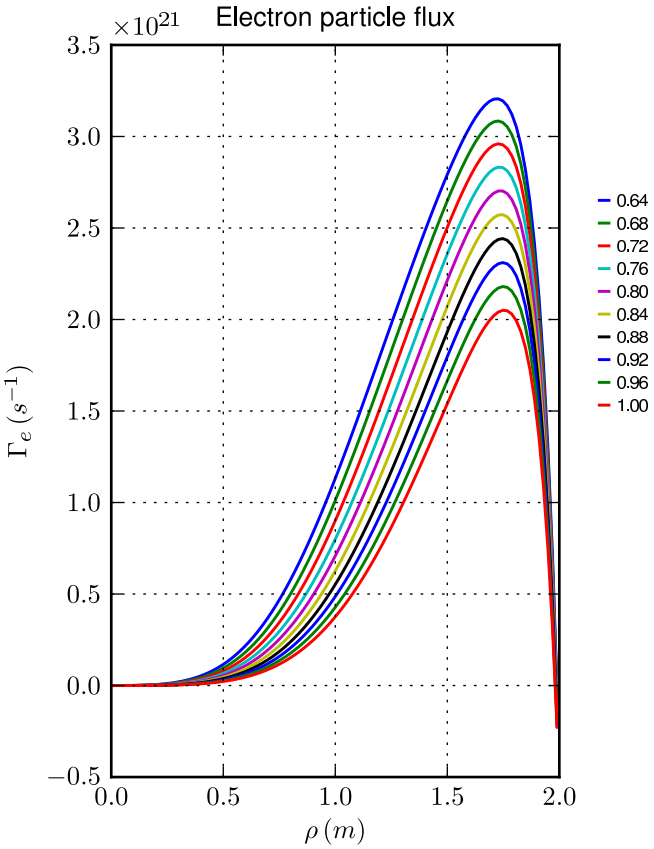
Electron density



Electron energy flux



Electron particle flux

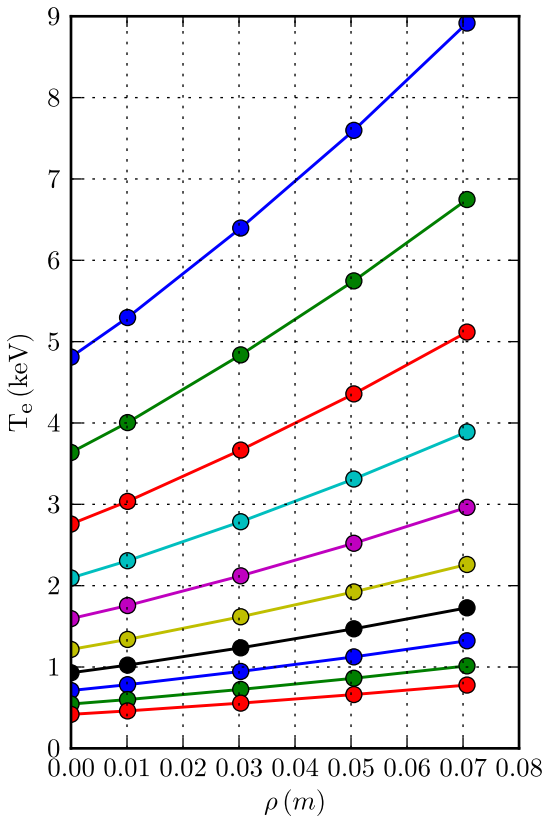


Profiles

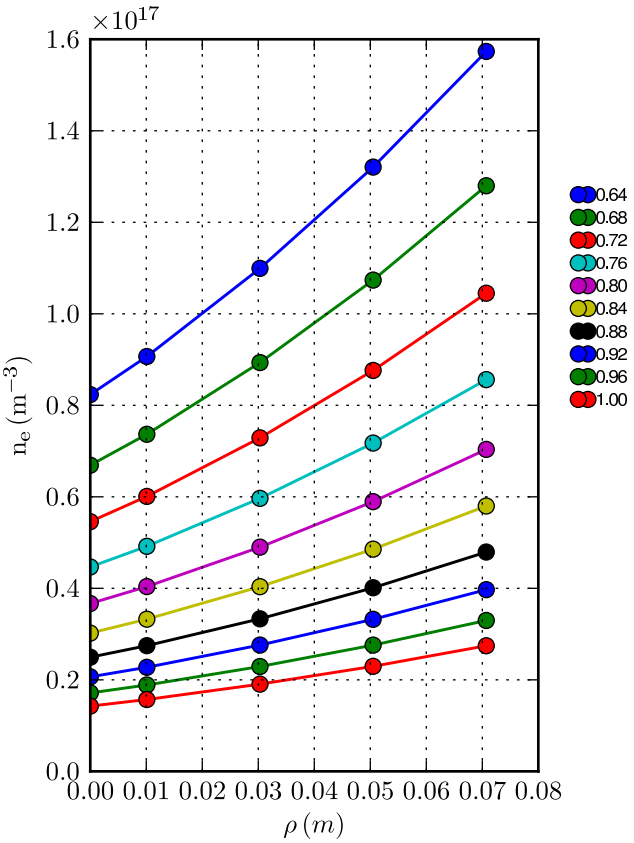
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Spatial zoom over magnetic axis; time sampling: last 10 time slices

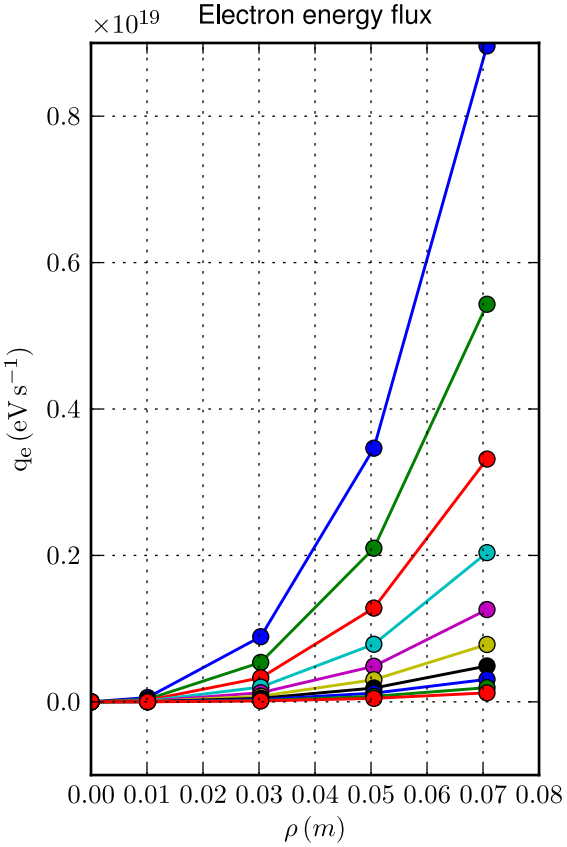
Electron temperature



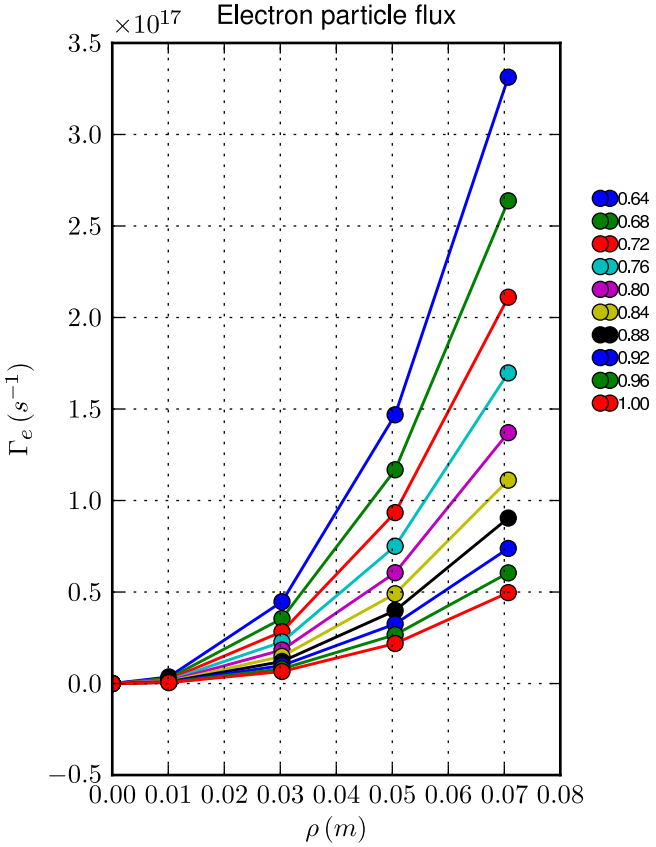
Electron density



Electron energy flux



Electron particle flux

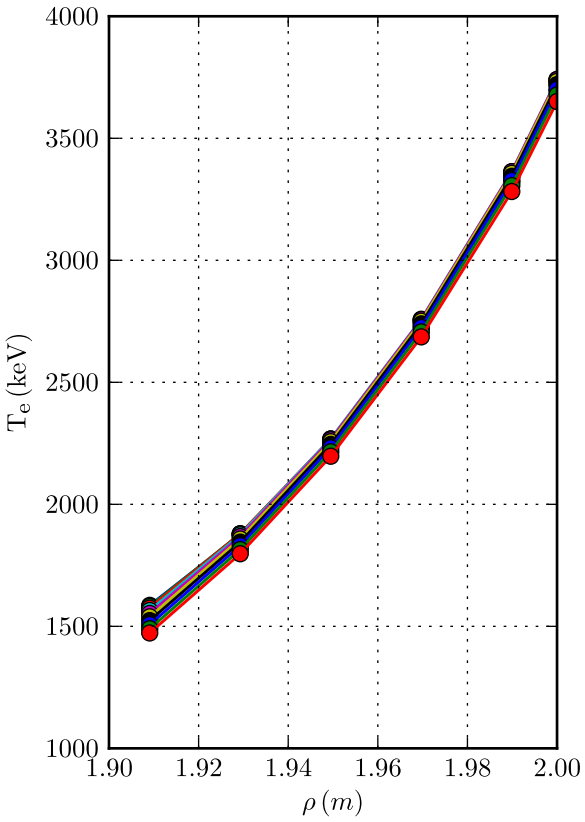


Profiles

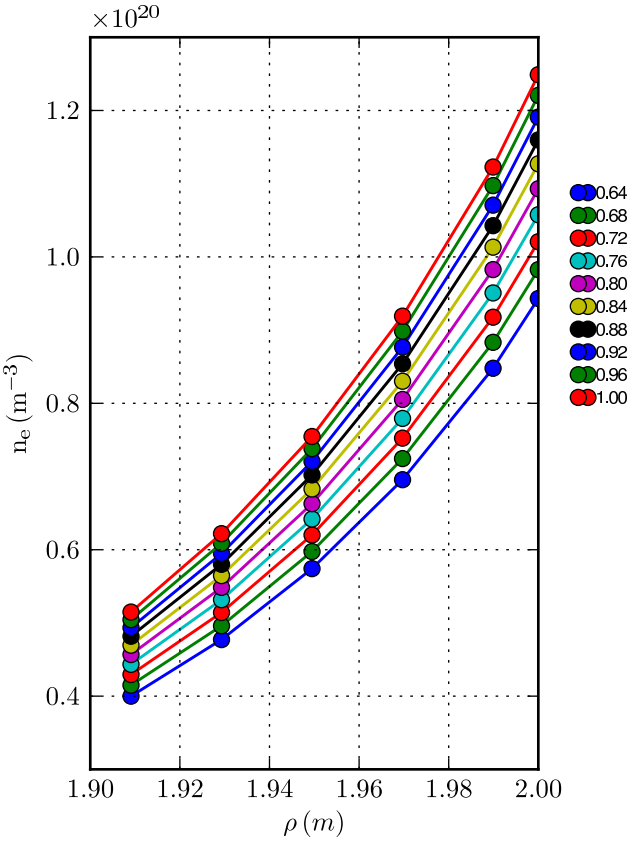
[Case: I.1.5.c, Solver: 4, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Spatial zoom over edge; time sampling: last 10 time slices

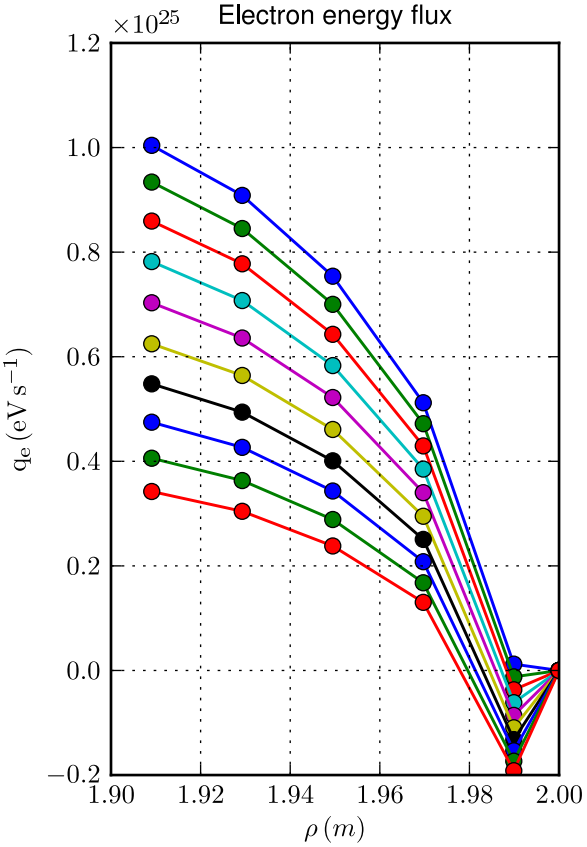
Electron temperature



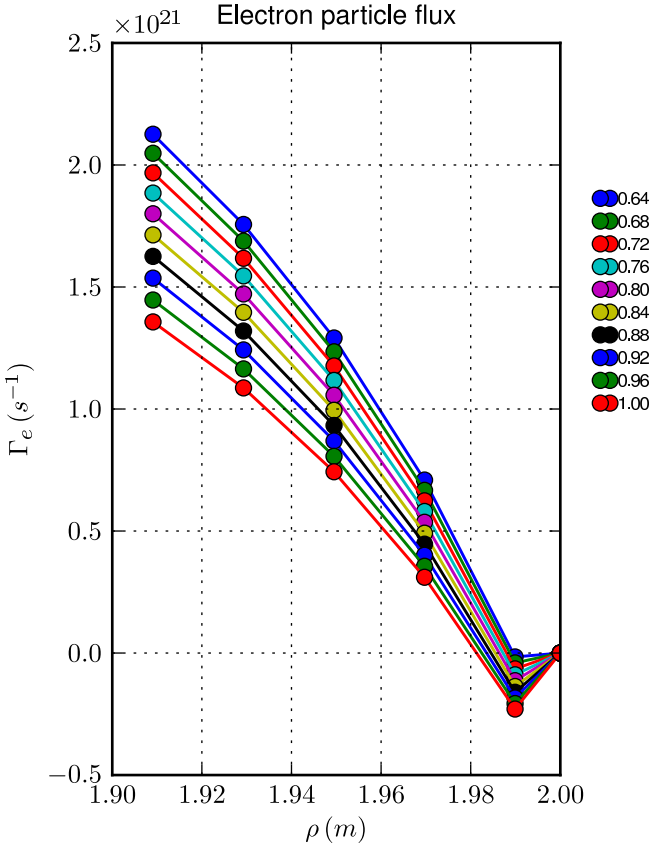
Electron density



Electron energy flux



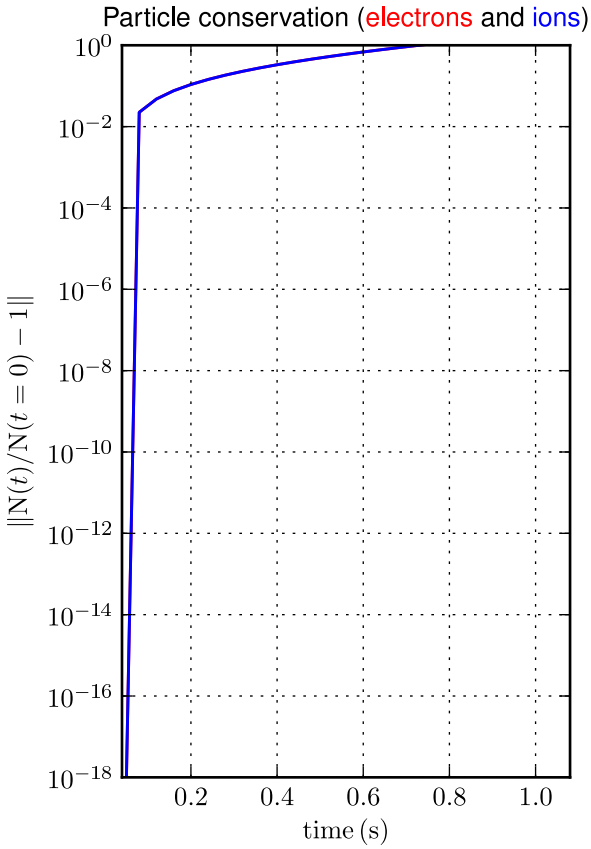
Electron particle flux

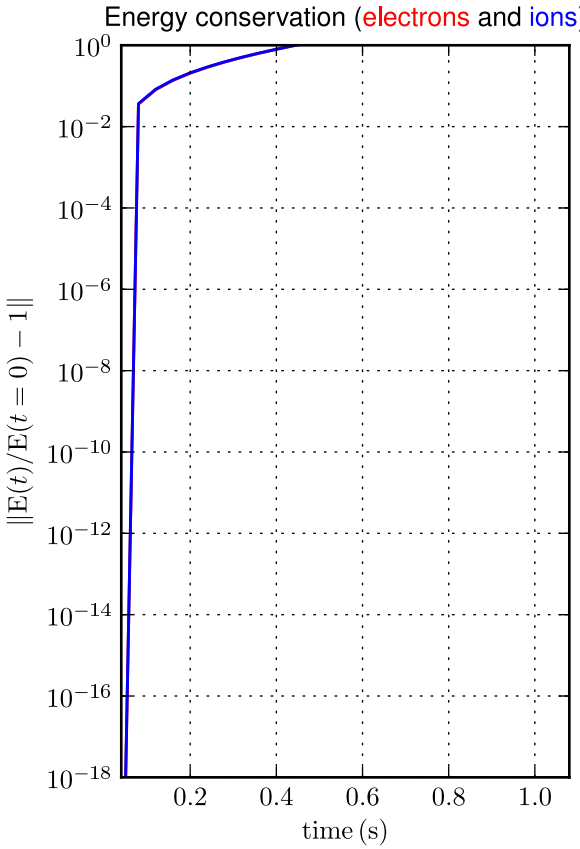


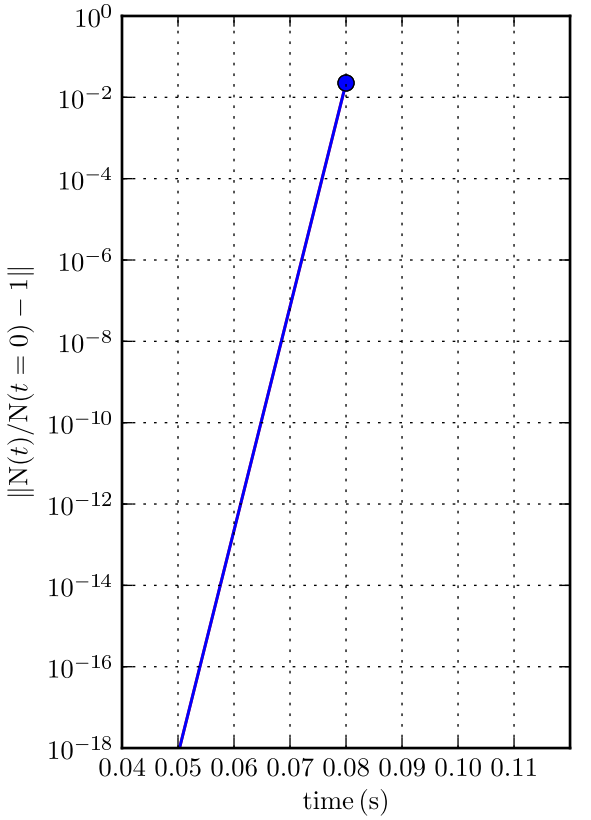
Part. & Energy conservation

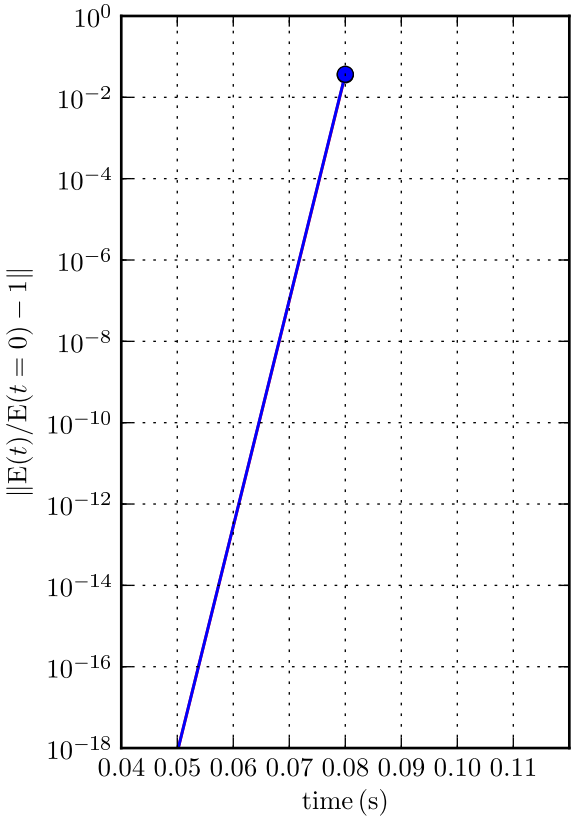
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - log scale; total time and zoom over time





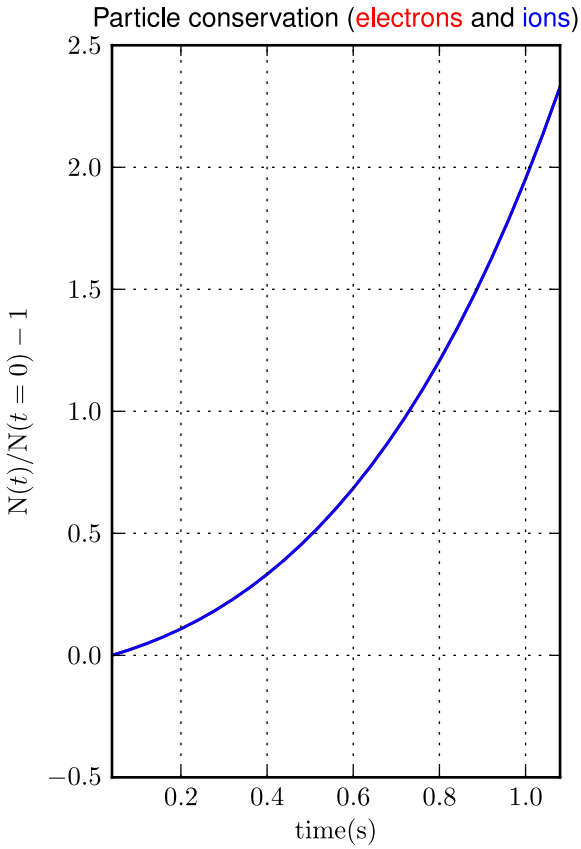


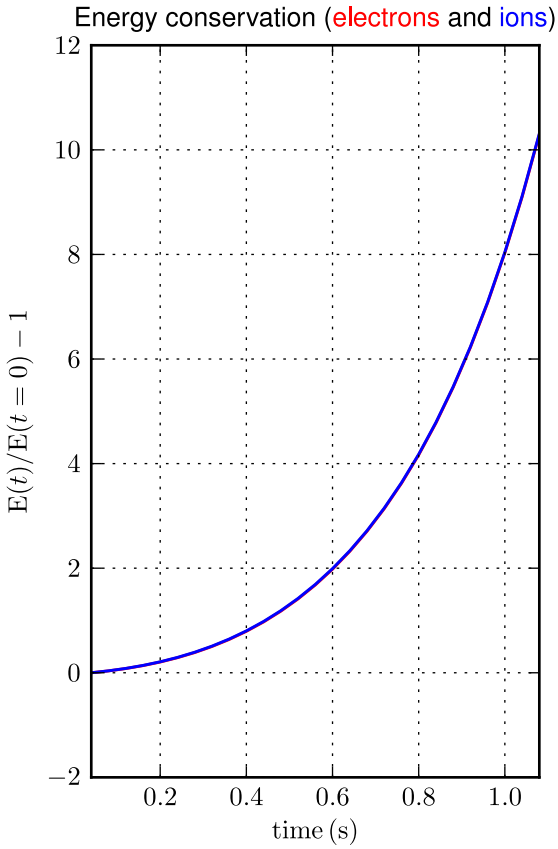


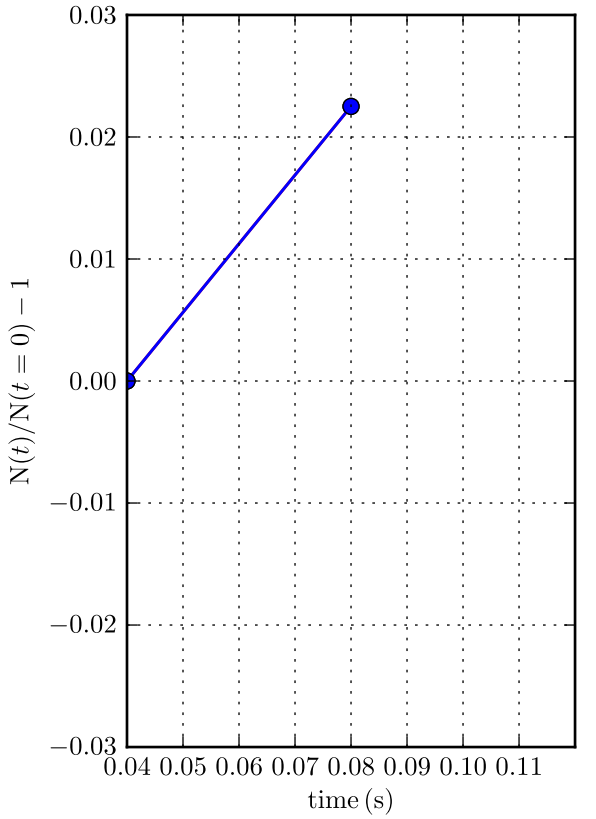
Part. & Energy conservation

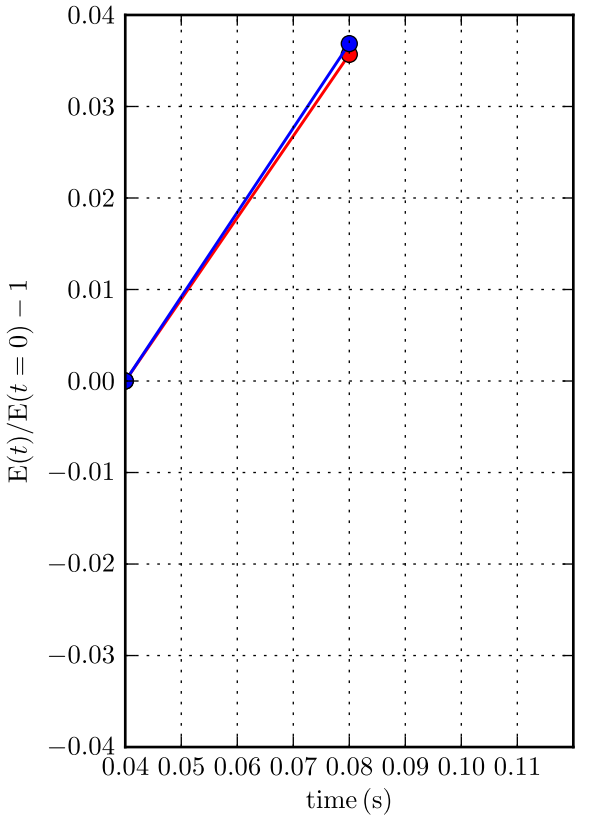
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - linear scale; total time and zoom over time







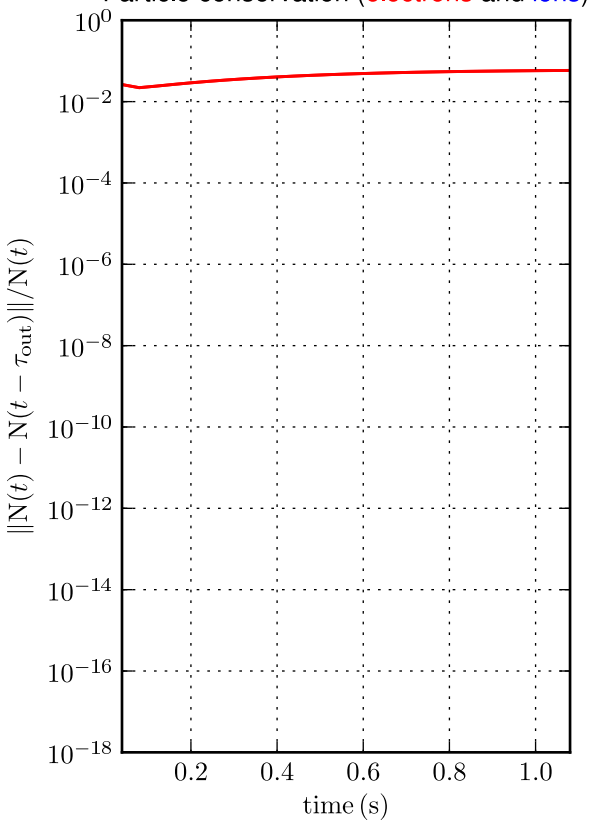


Part. & Energy conservation

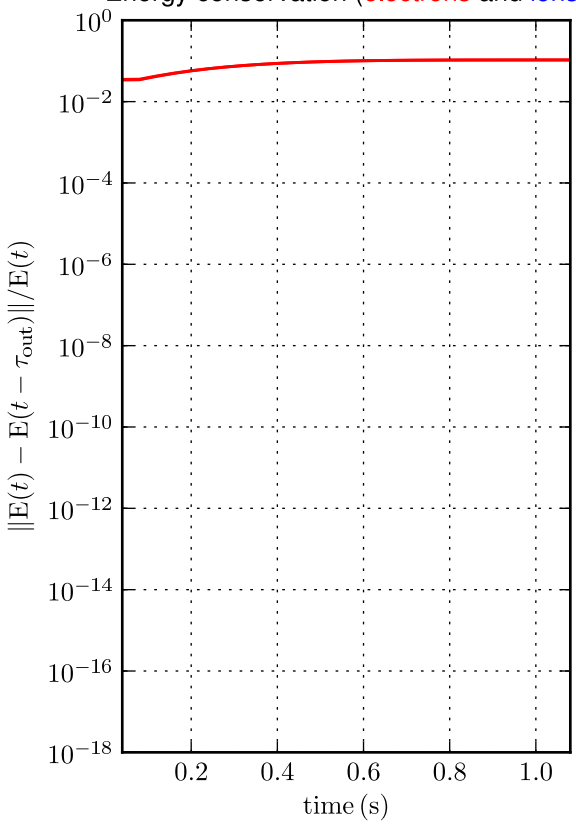
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

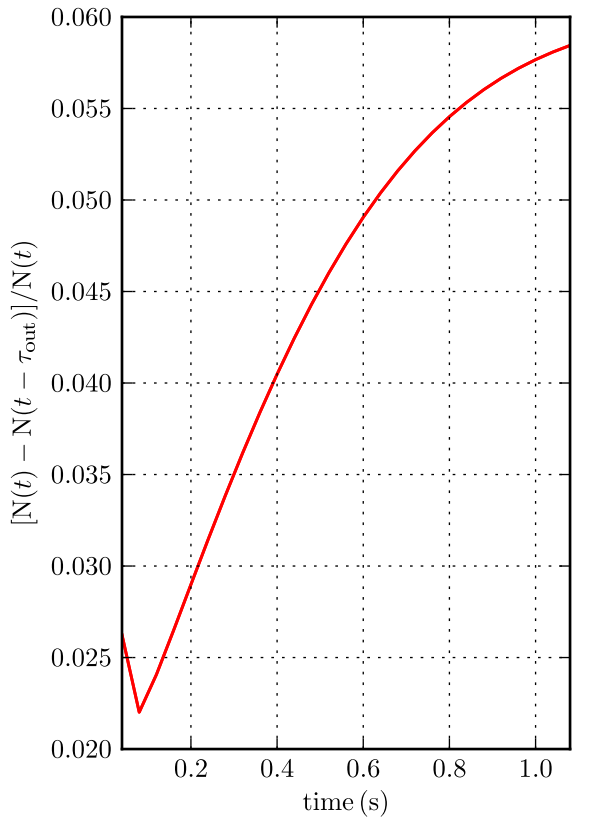
Comparison with previous time-sampled (τ_{out}) solution - log and linear scales

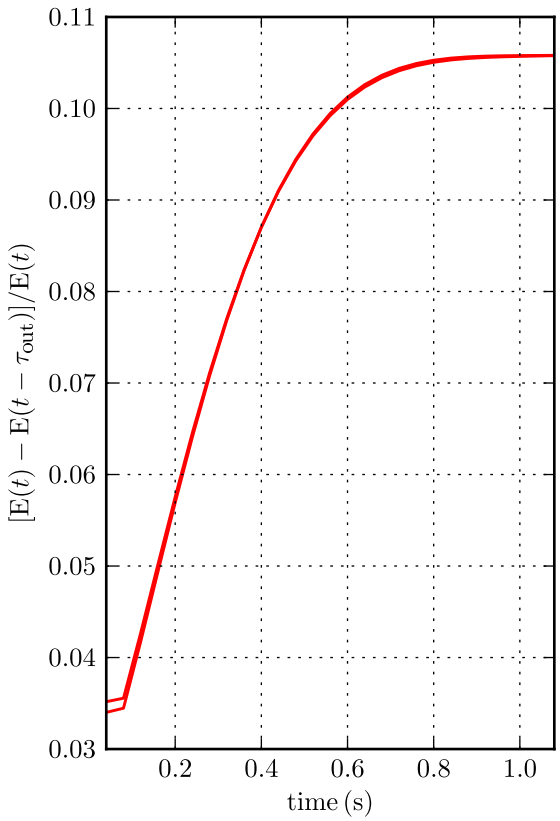
Particle conservation (electrons and ions)



Energy conservation (electrons and ions)



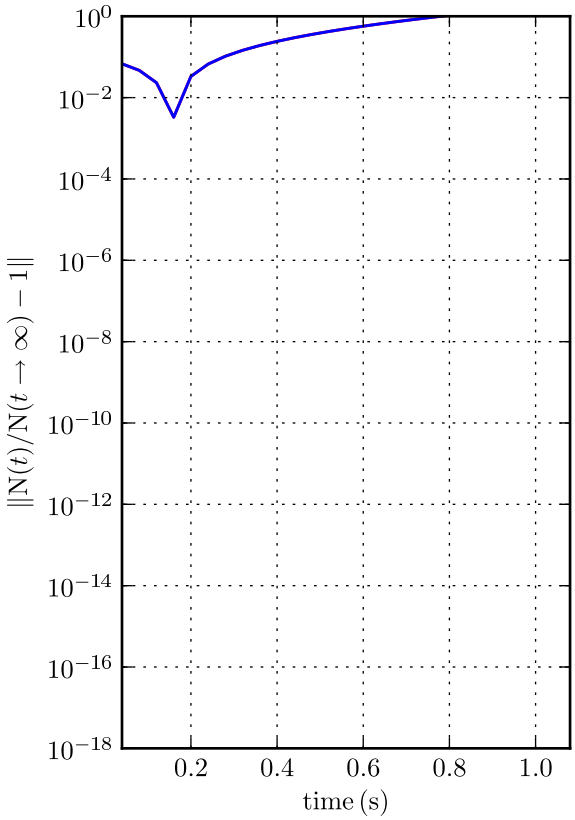


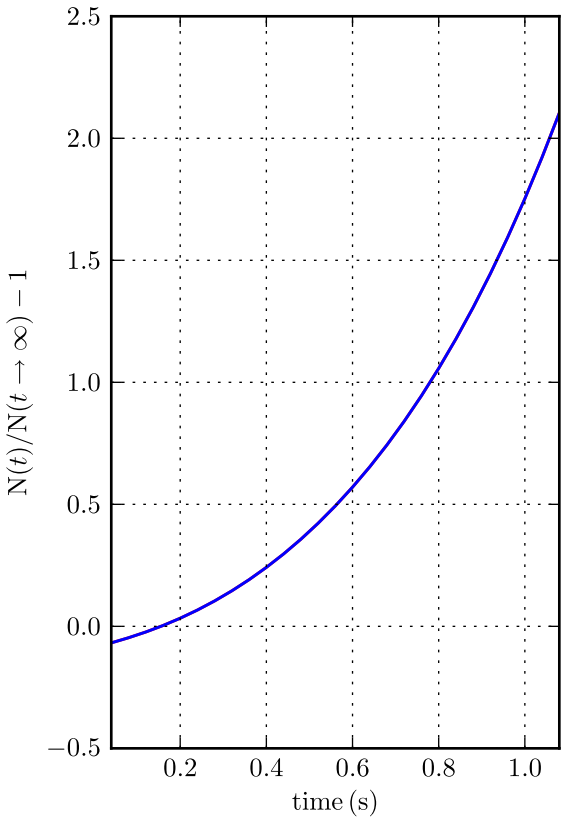


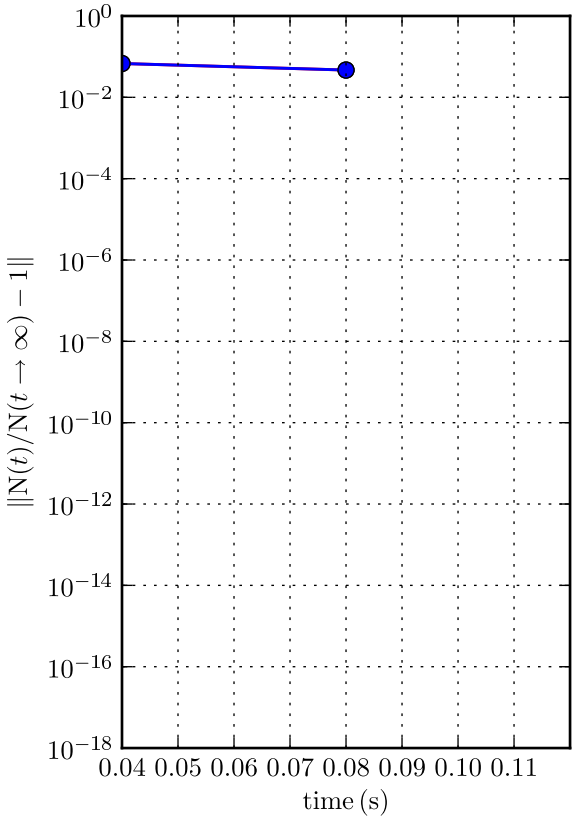
Particle conservation

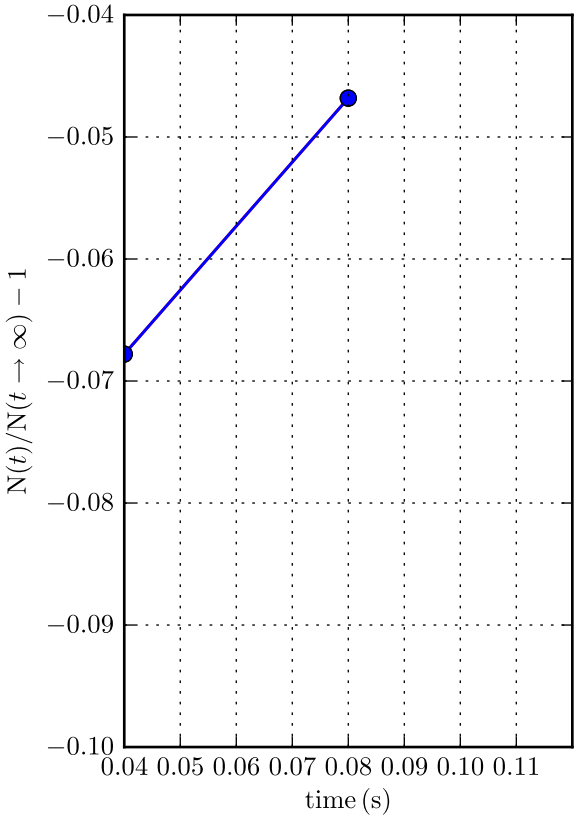
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution (electrons and ions); total time and zoom over time





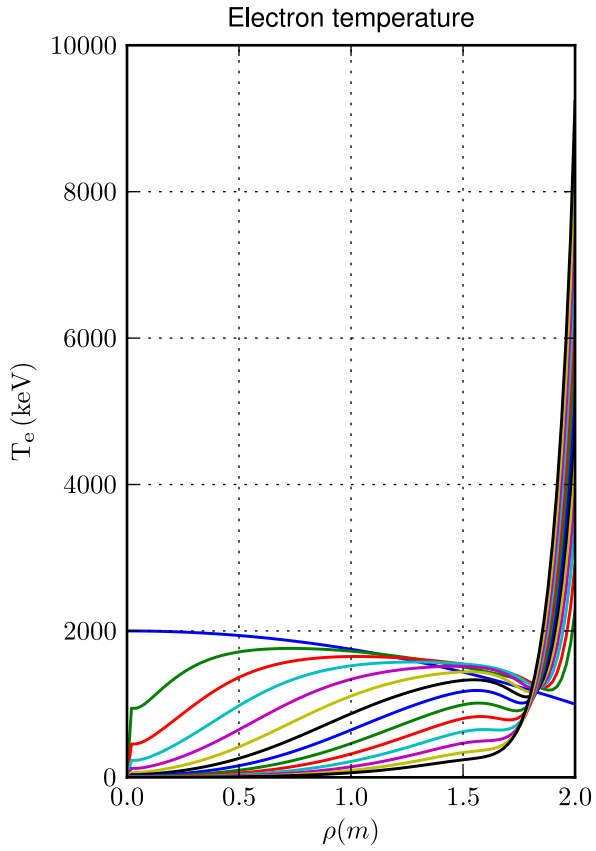


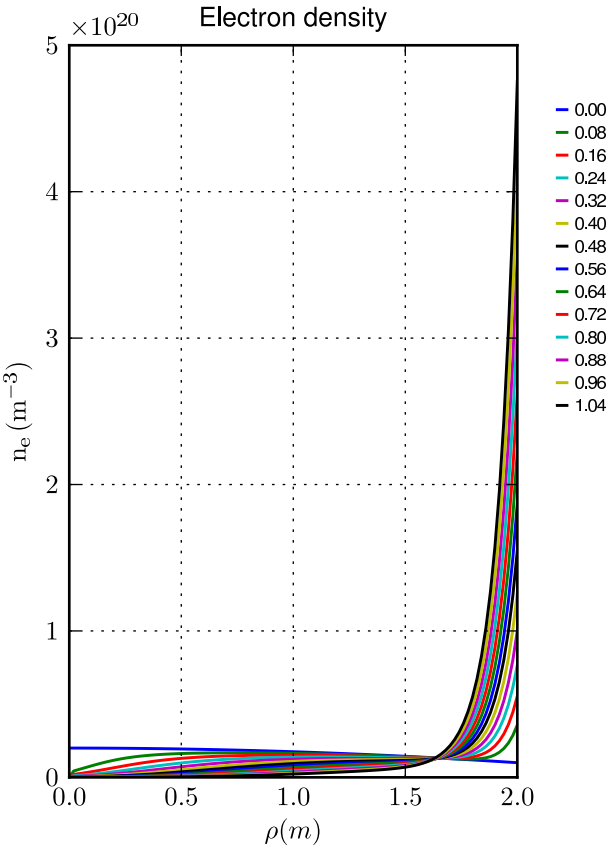


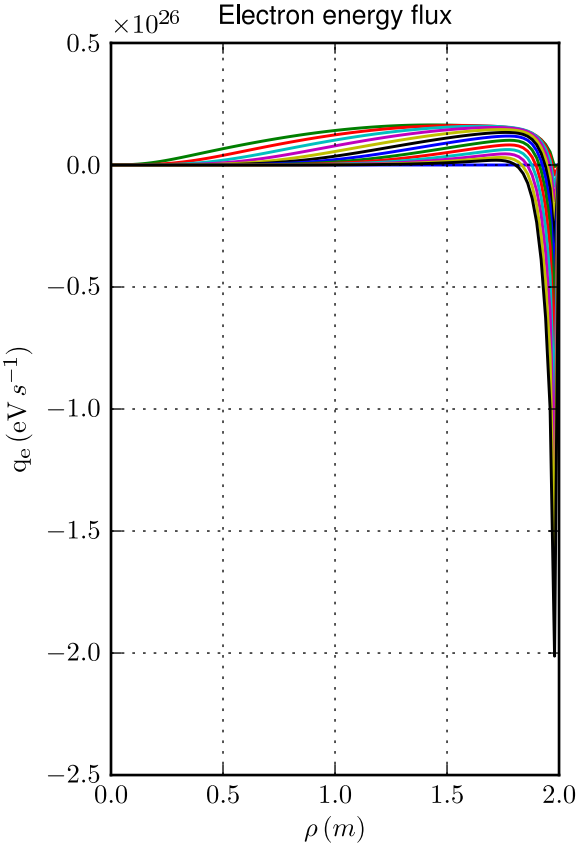
Profiles

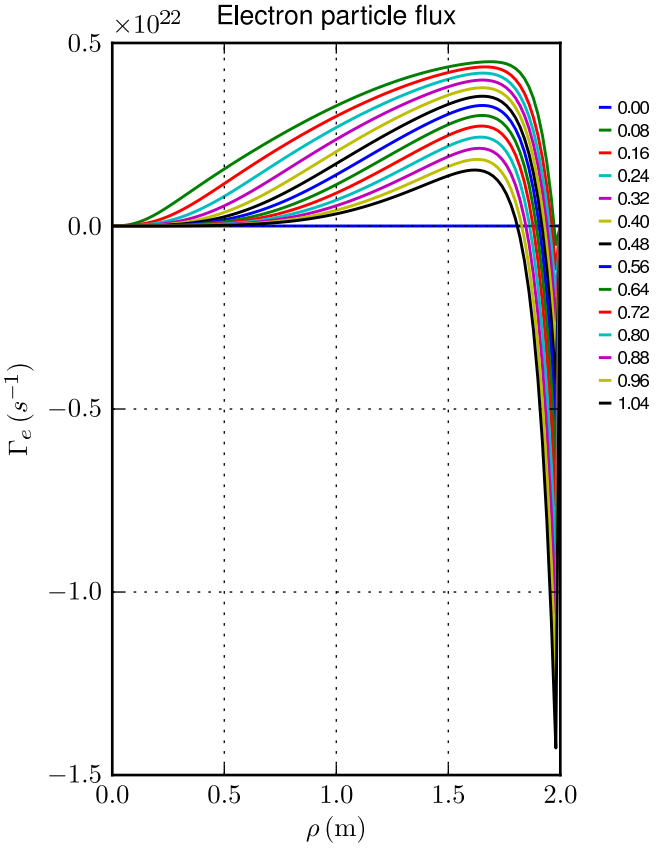
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: total simulation time/10







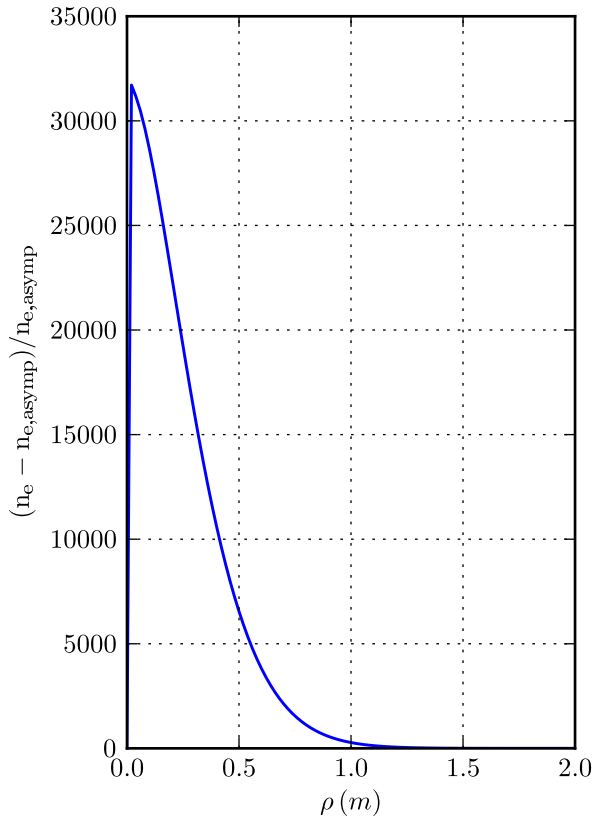


Profiles

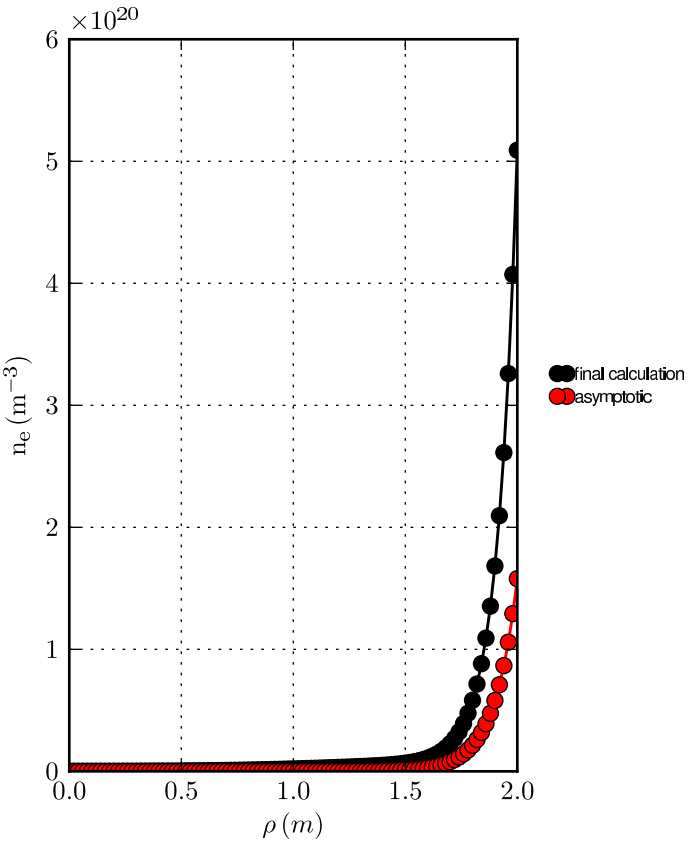
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution

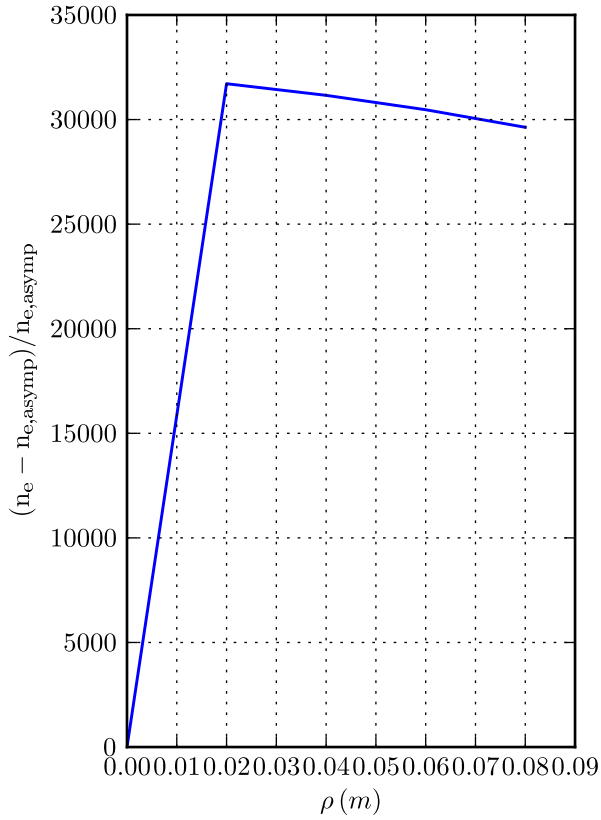
Electron density relative error



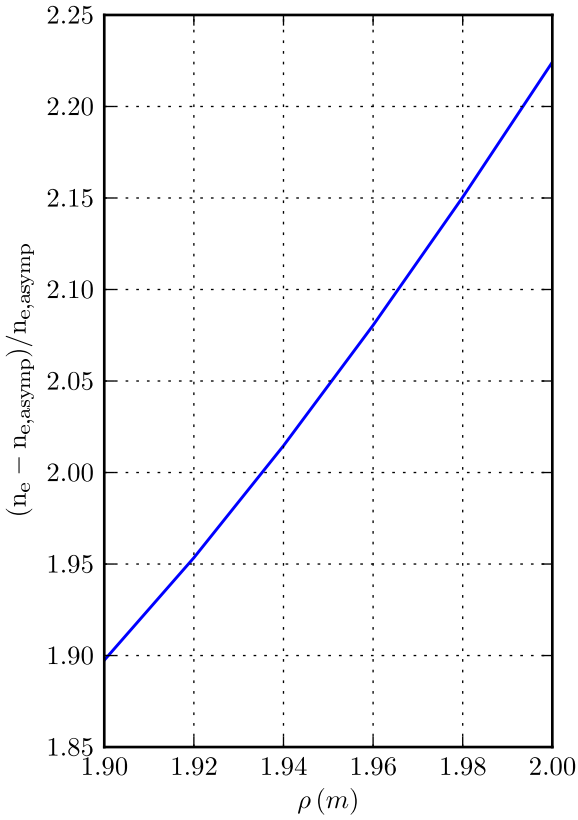
Electron density



Error: zoom over axis



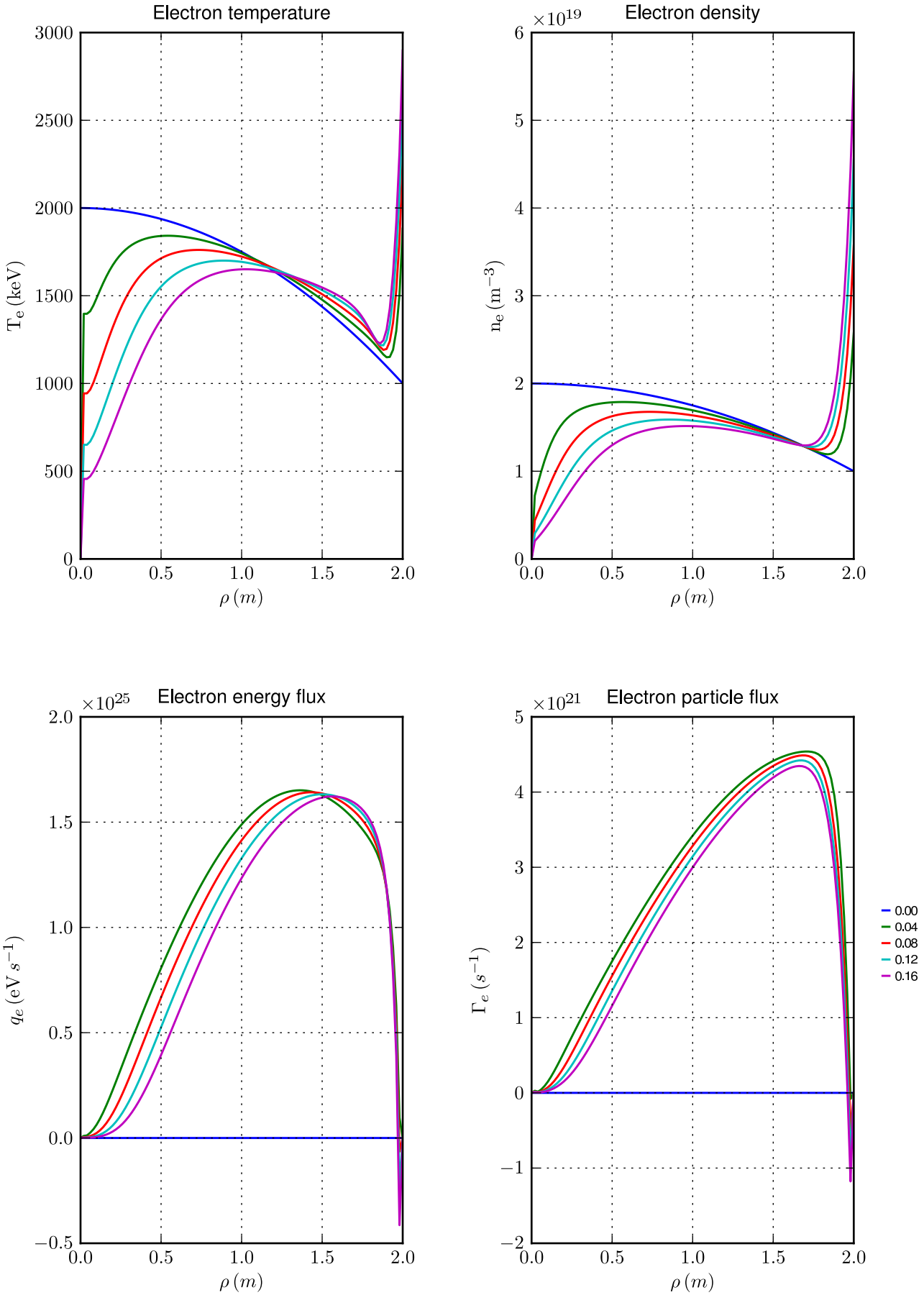
Error: zoom over edge



Profiles

[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s

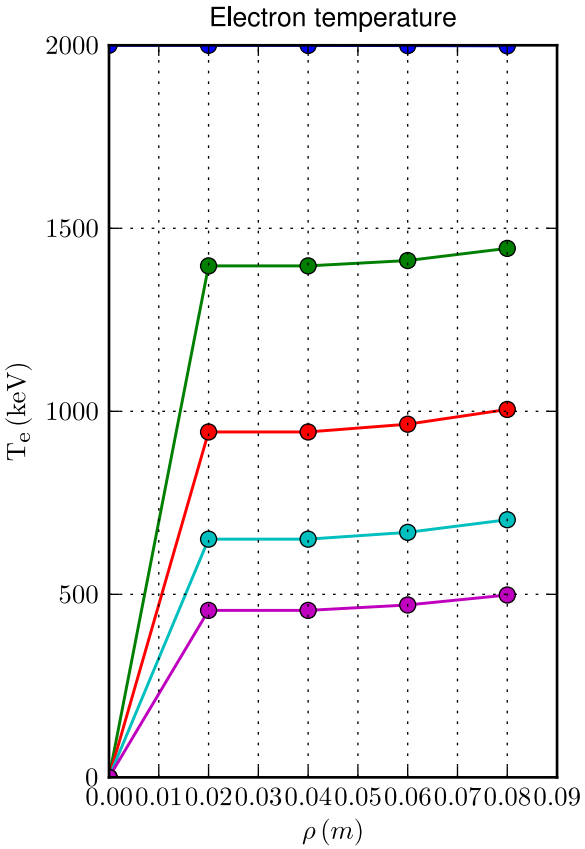


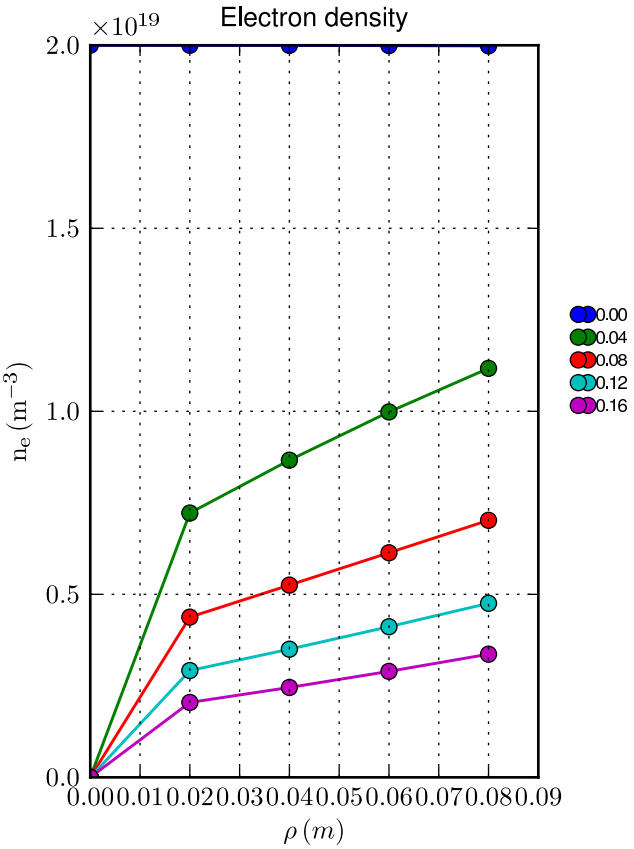
Profiles

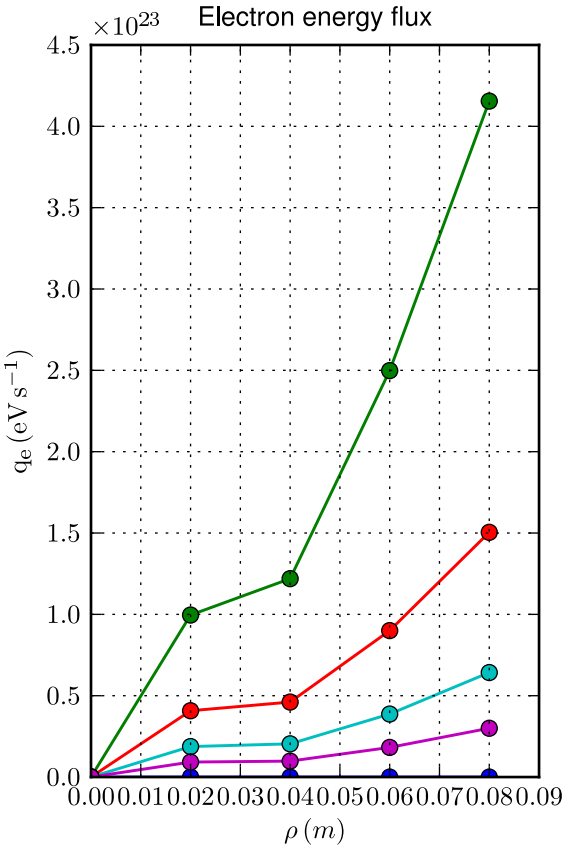
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

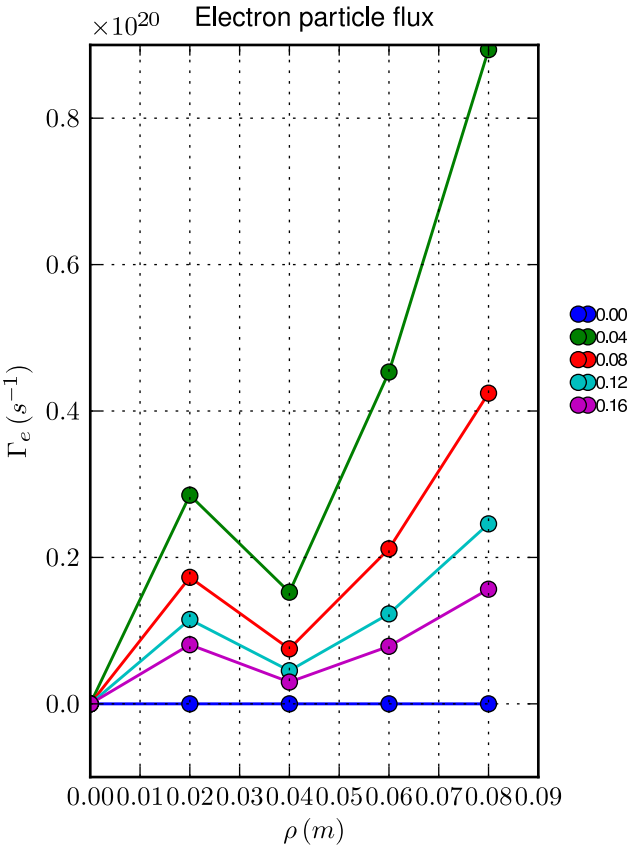
Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







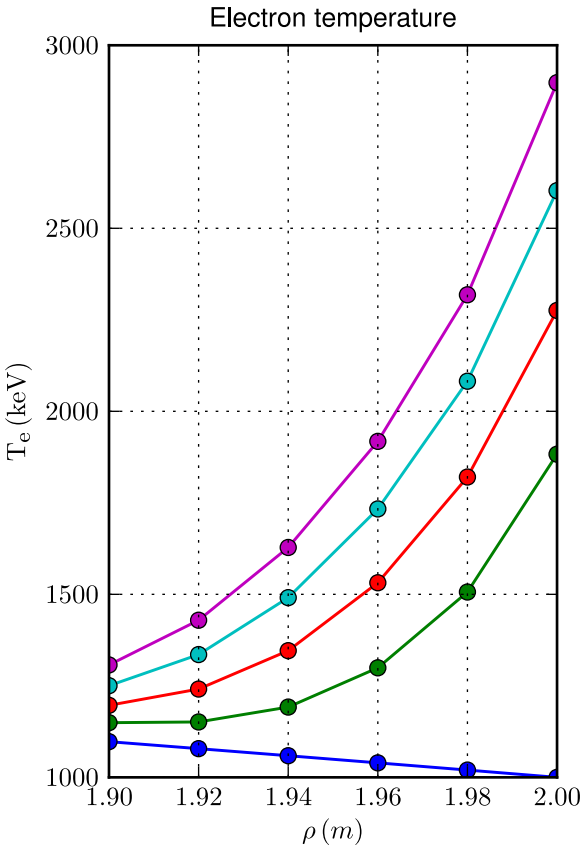


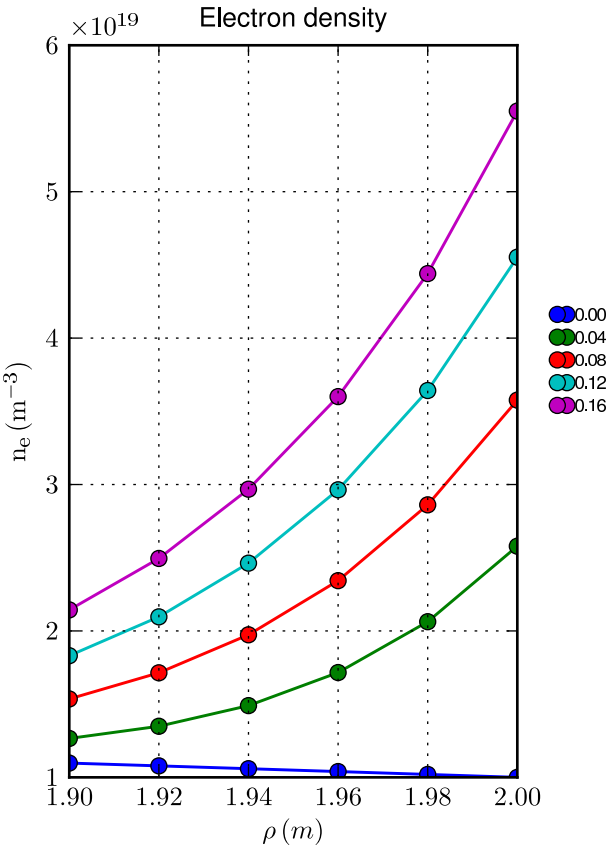
Profiles

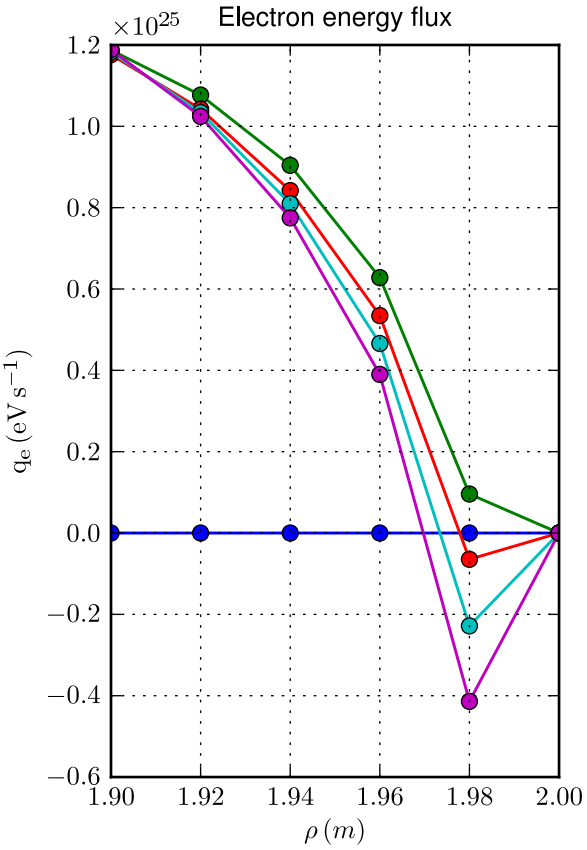
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

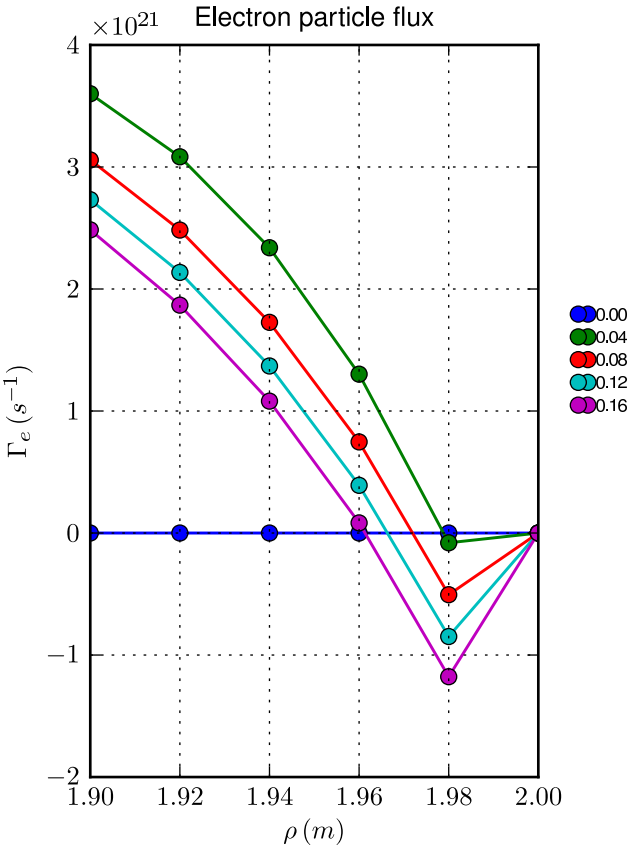
Spatial zoom over edge

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







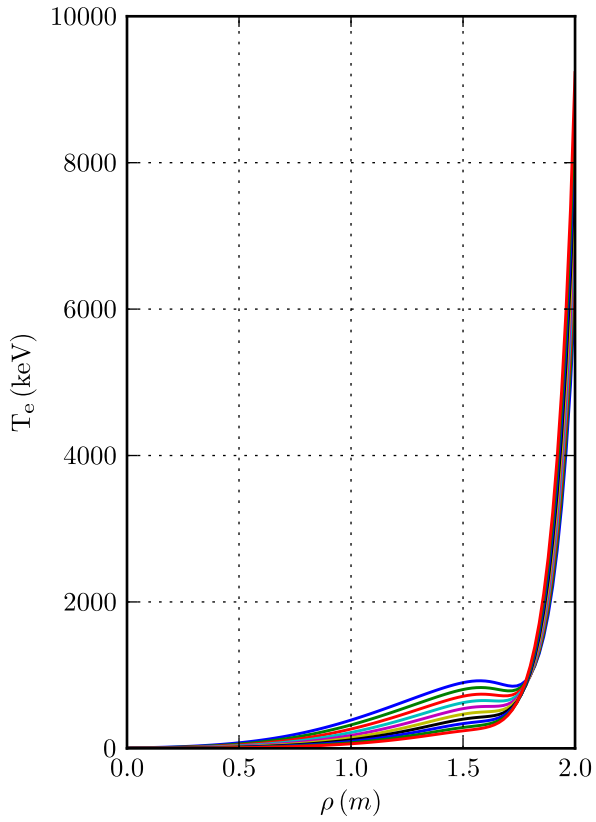


Profiles

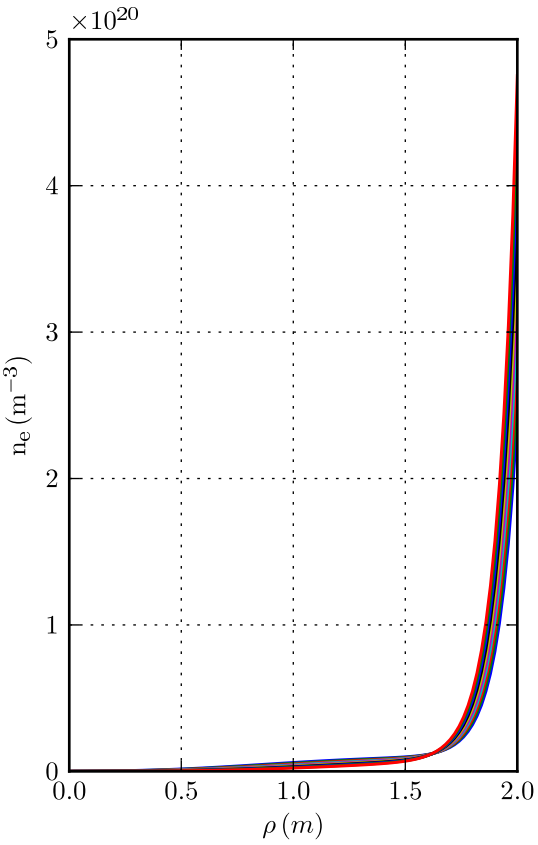
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: last 10 time slices

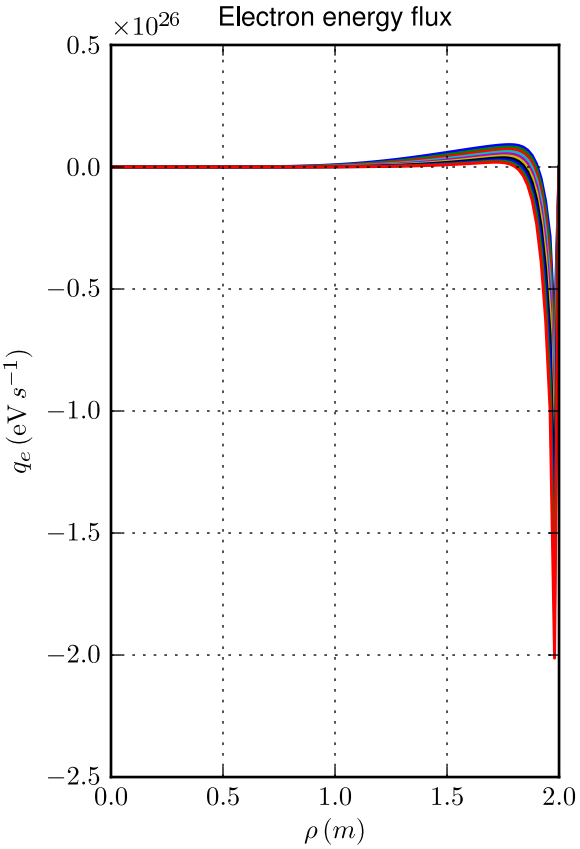
Electron temperature



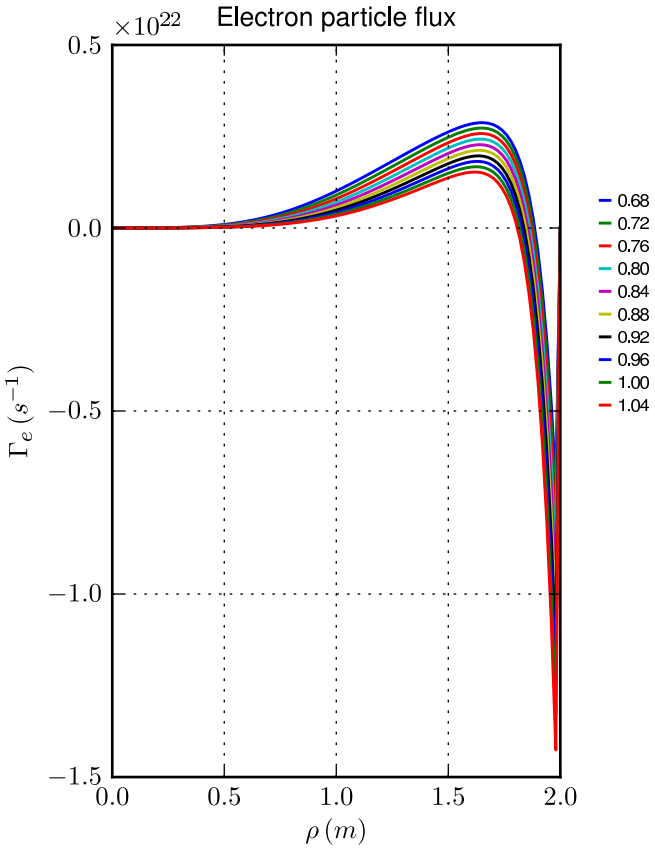
Electron density



Electron energy flux



Electron particle flux

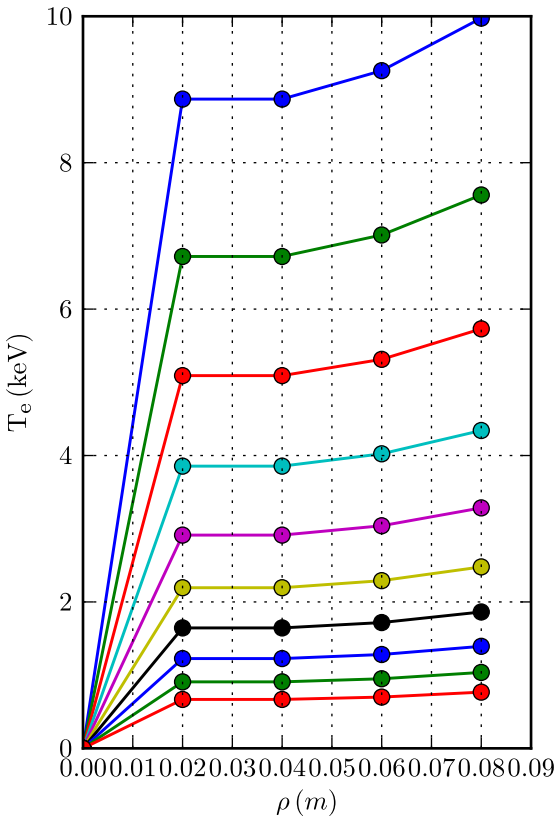


Profiles

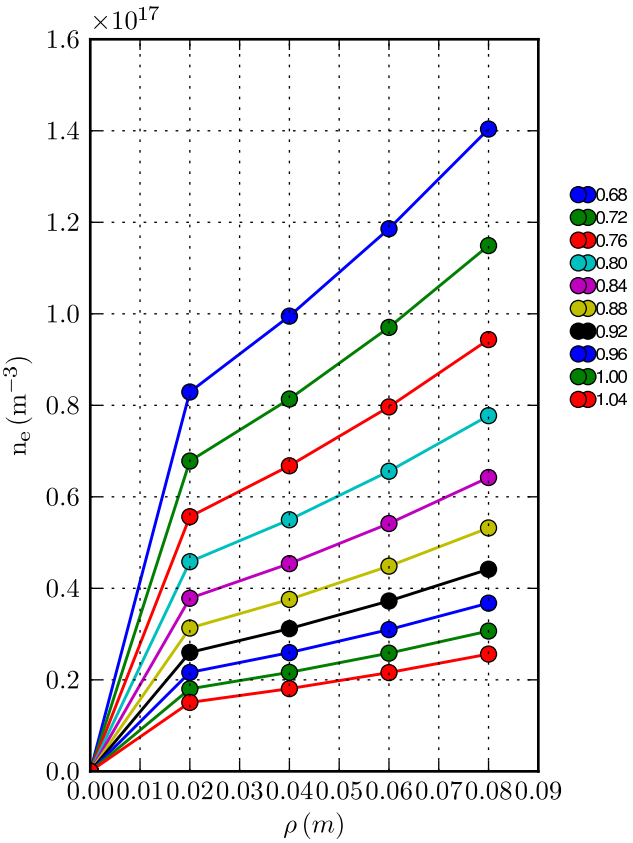
[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Spatial zoom over magnetic axis; time sampling: last 10 time slices

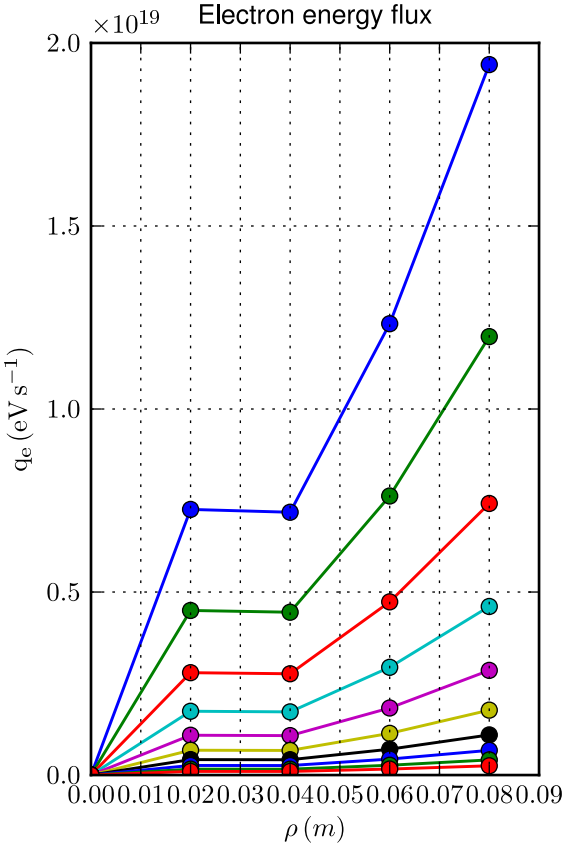
Electron temperature



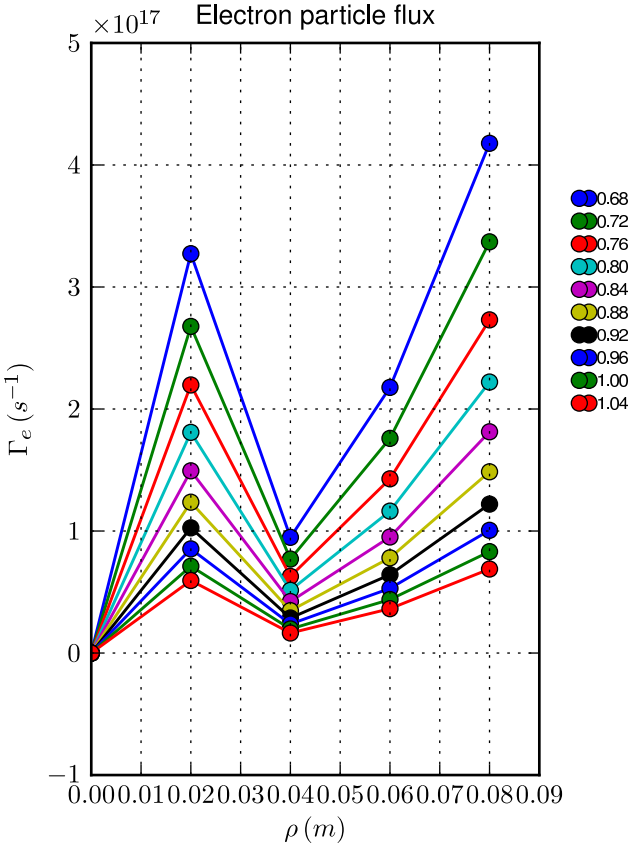
Electron density



Electron energy flux



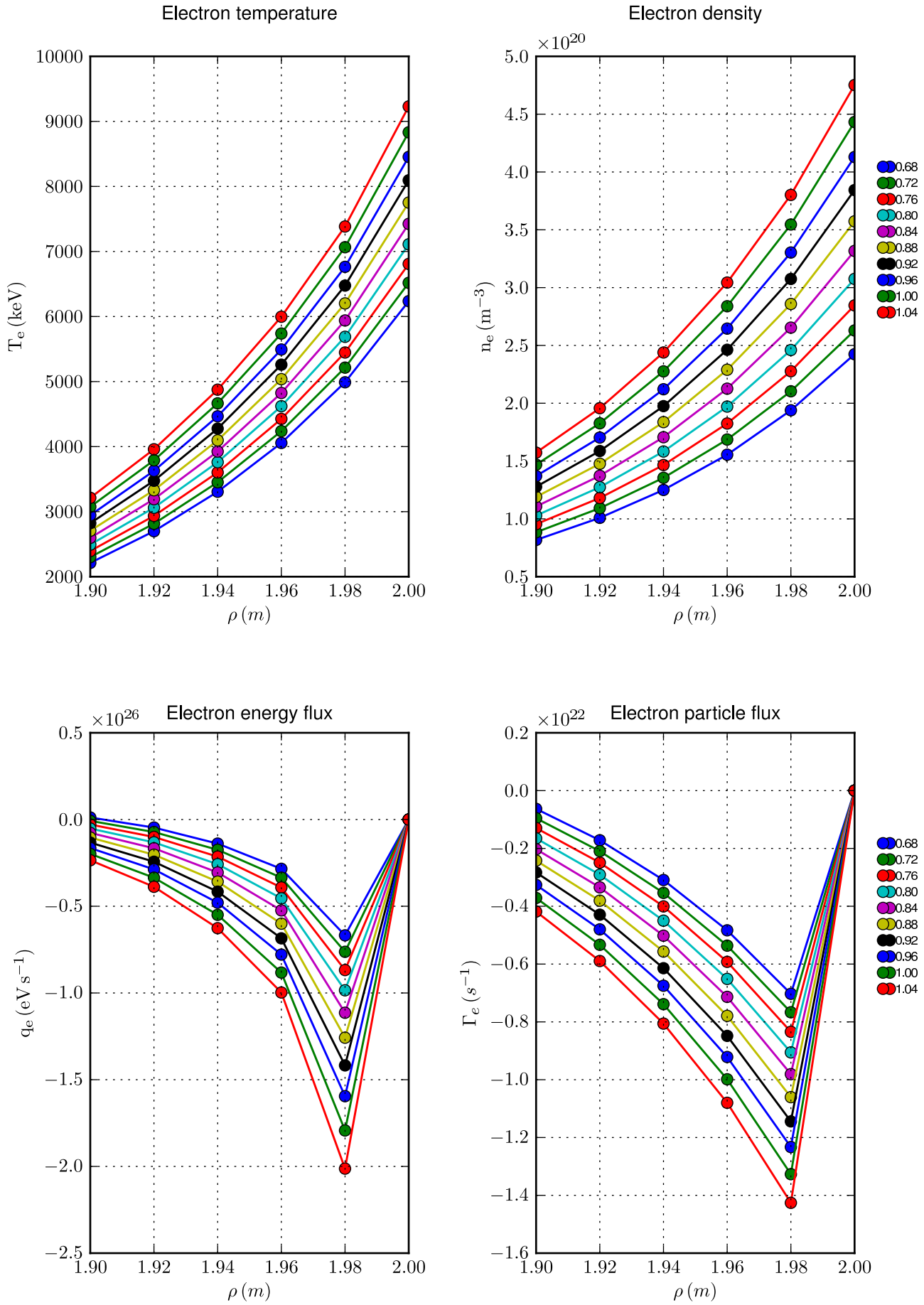
Electron particle flux



Profiles

[Case: I.1.5.c, Solver: 7, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

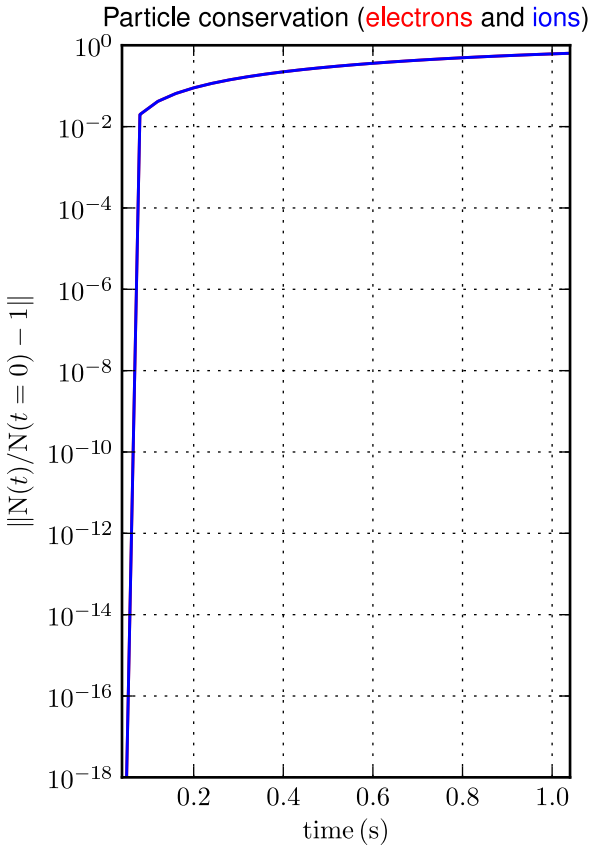
Spatial zoom over edge; time sampling: last 10 time slices

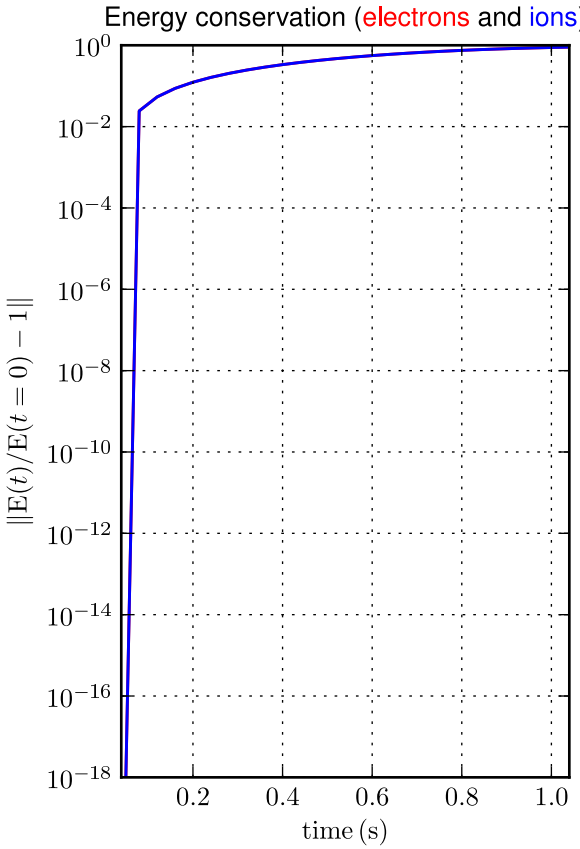


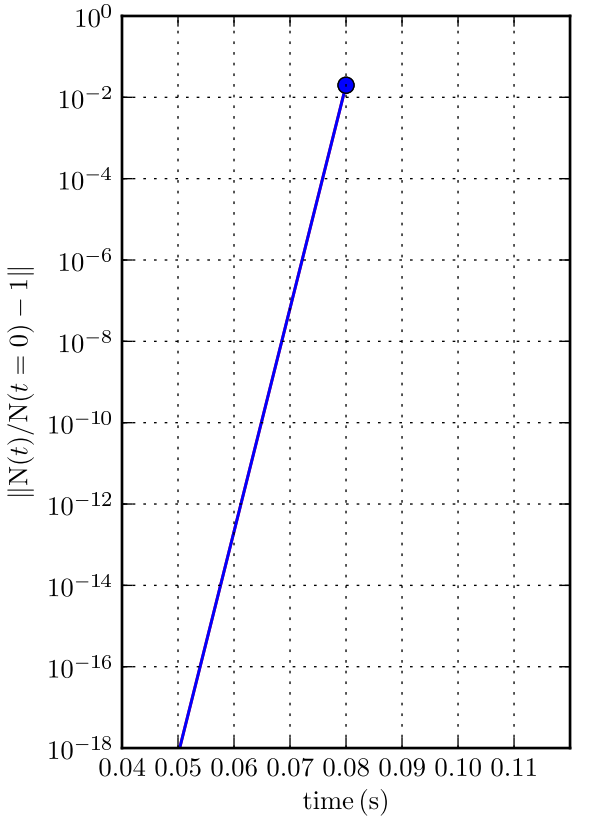
Part. & Energy conservation

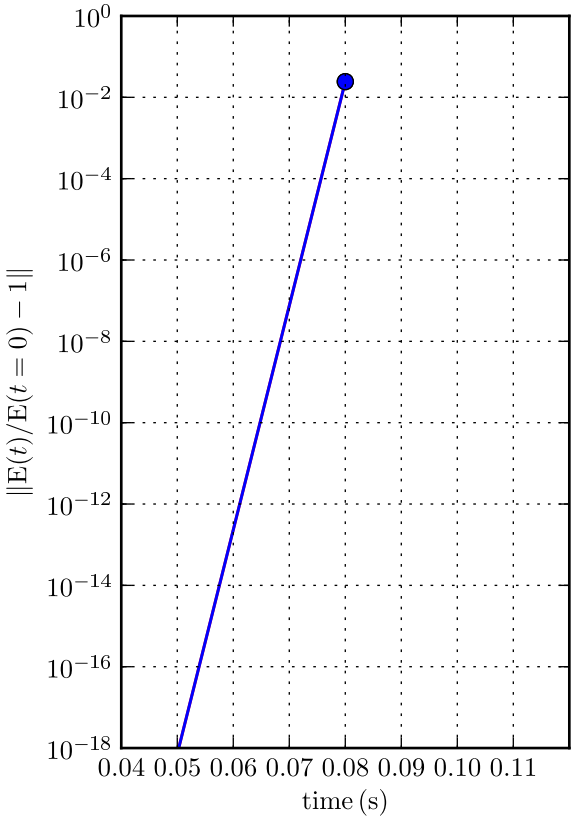
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - log scale; total time and zoom over time





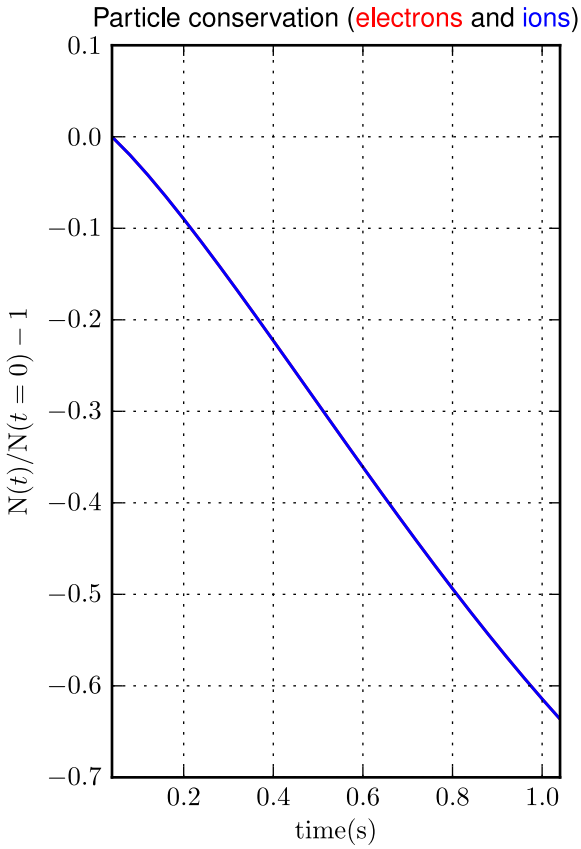


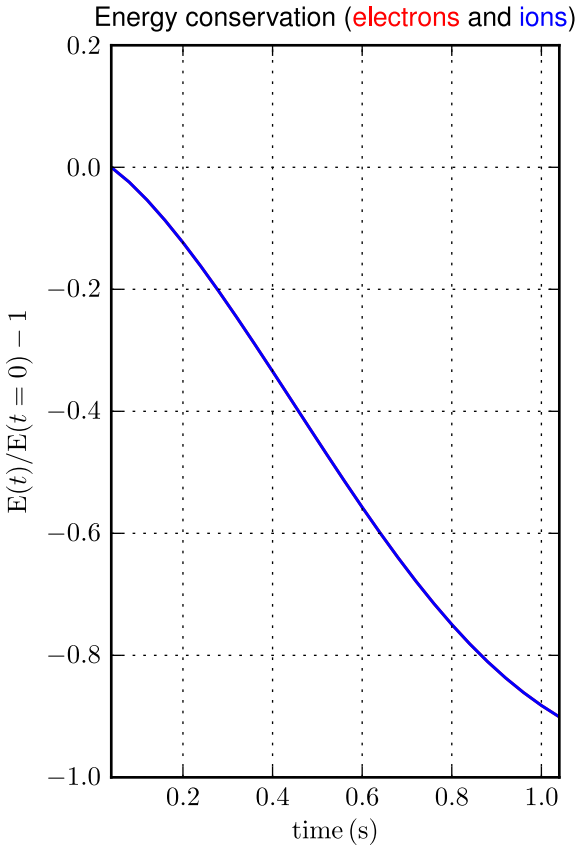


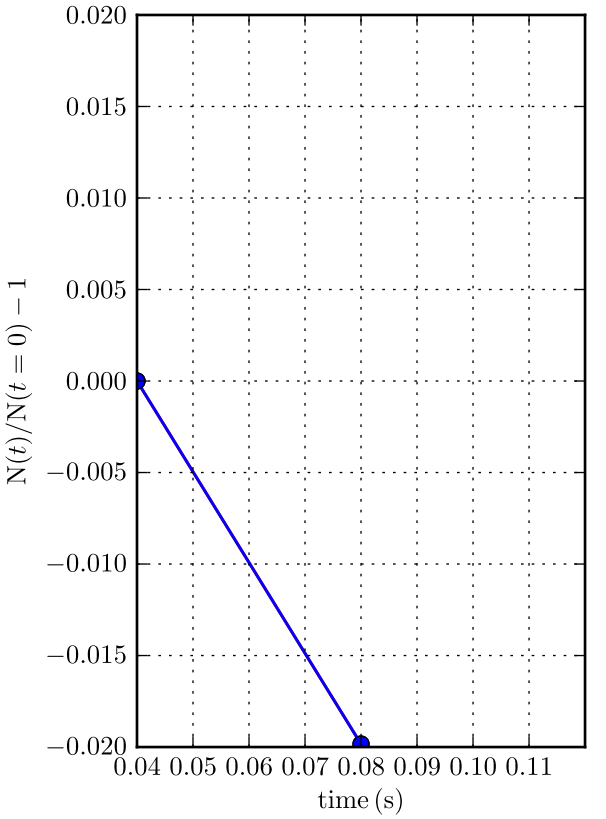
Part. & Energy conservation

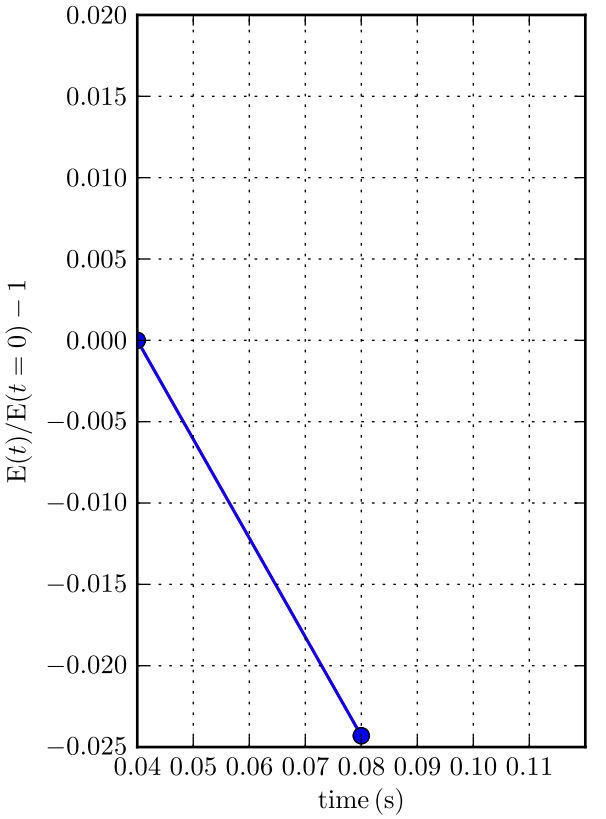
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with initial solution - linear scale; total time and zoom over time





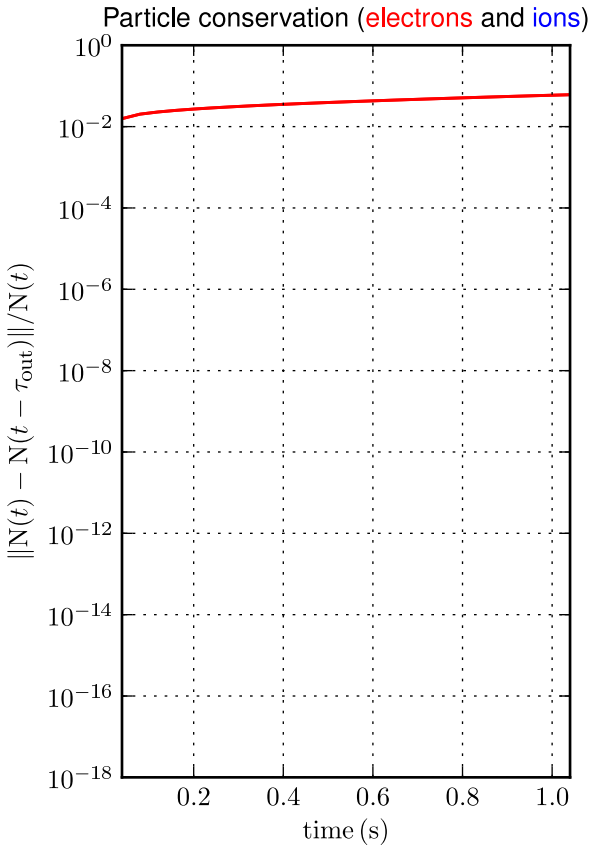


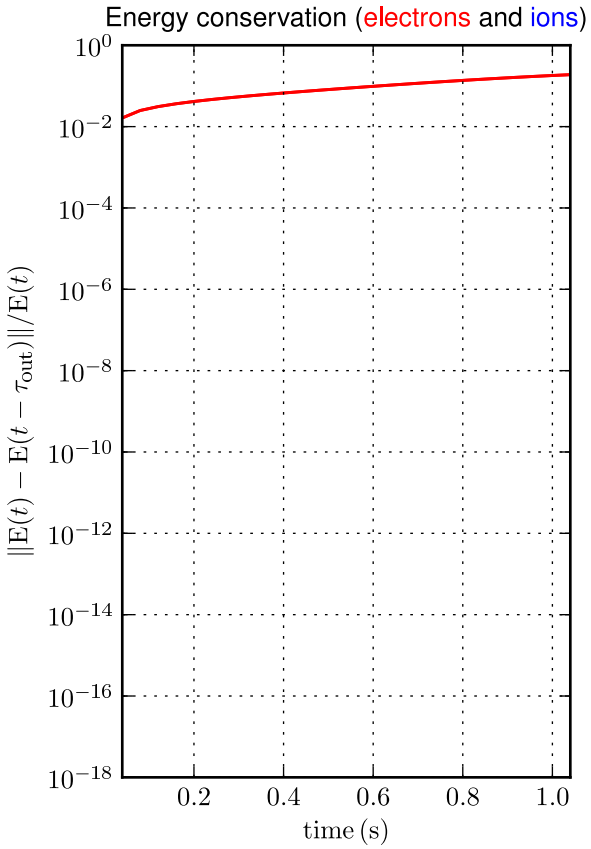


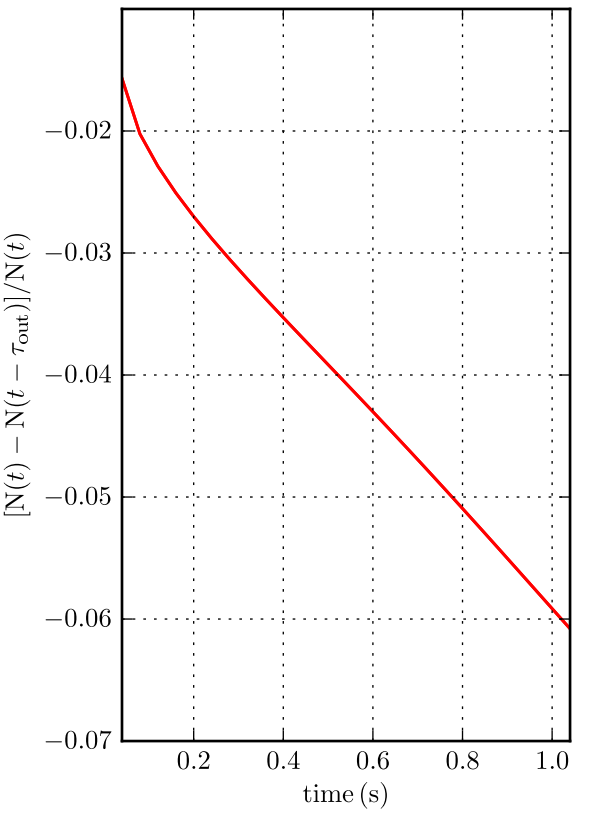
Part. & Energy conservation

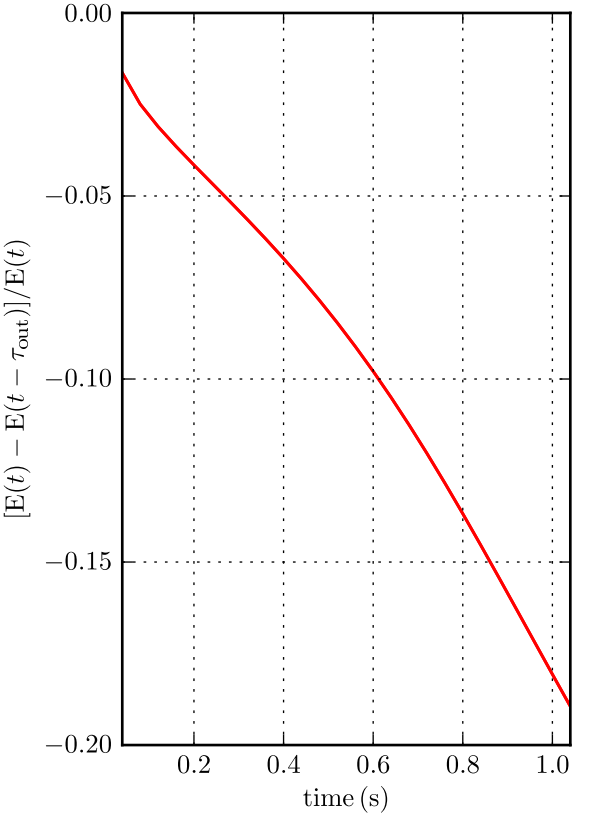
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with previous time-sampled (τ_{out}) solution - log and linear scales





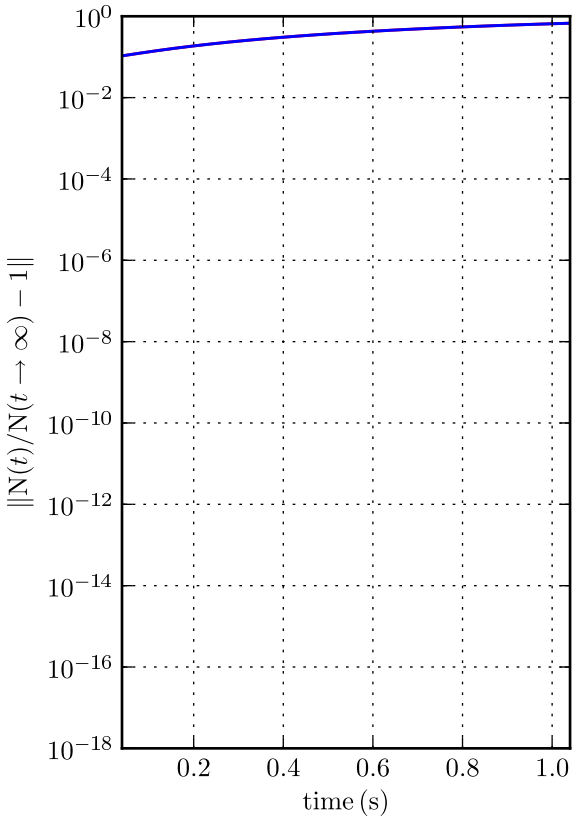


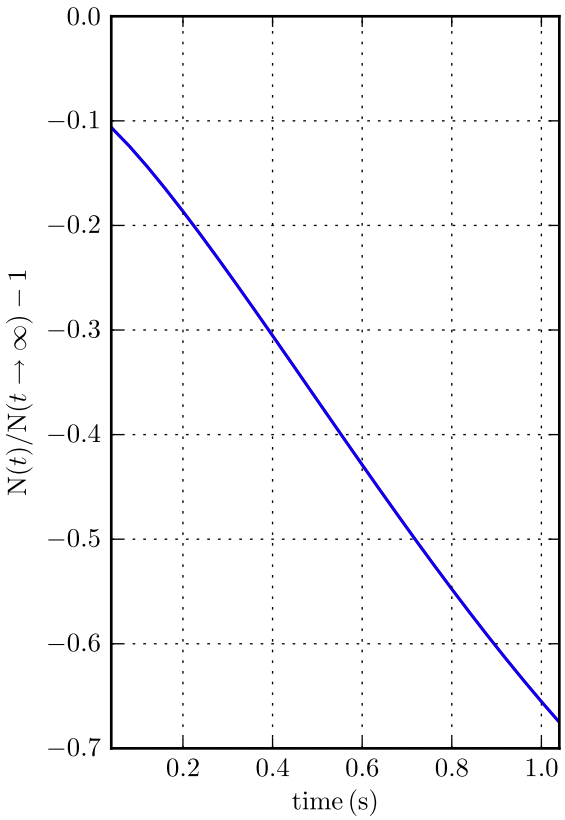


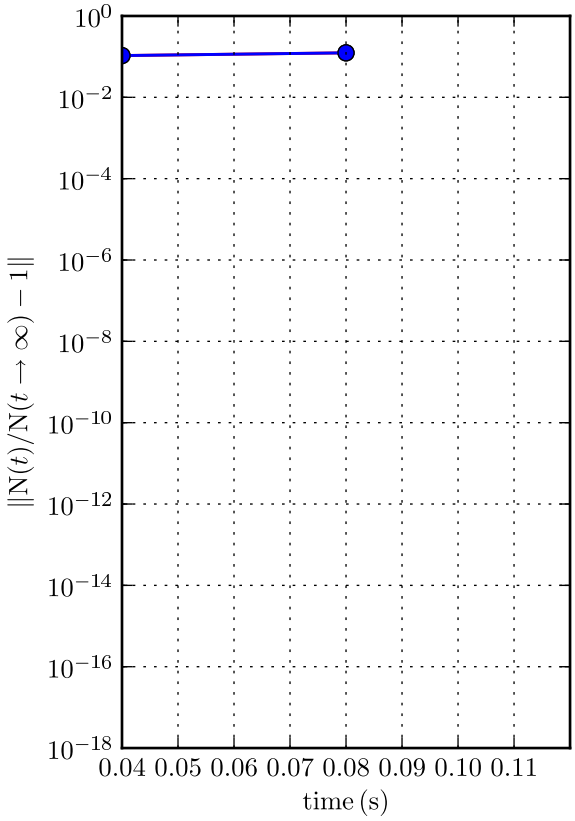
Particle conservation

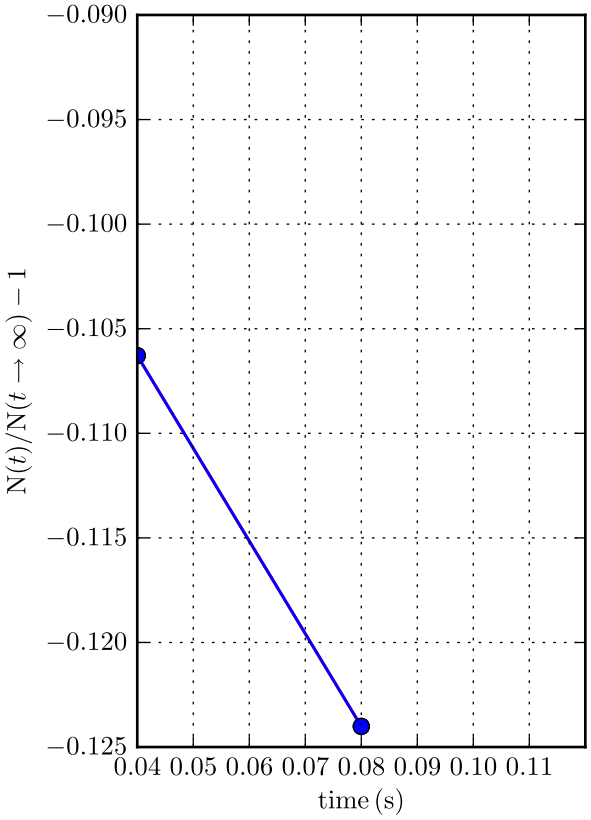
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution (electrons and ions); total time and zoom over time





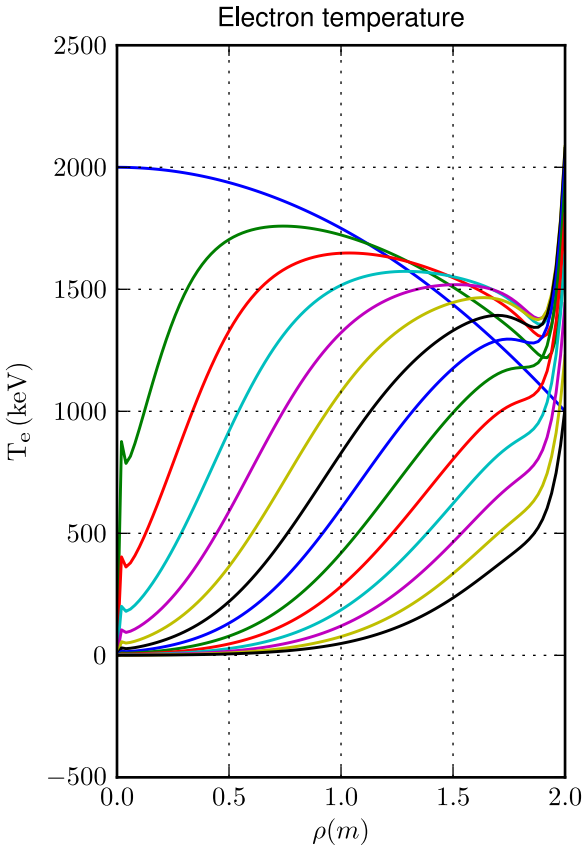


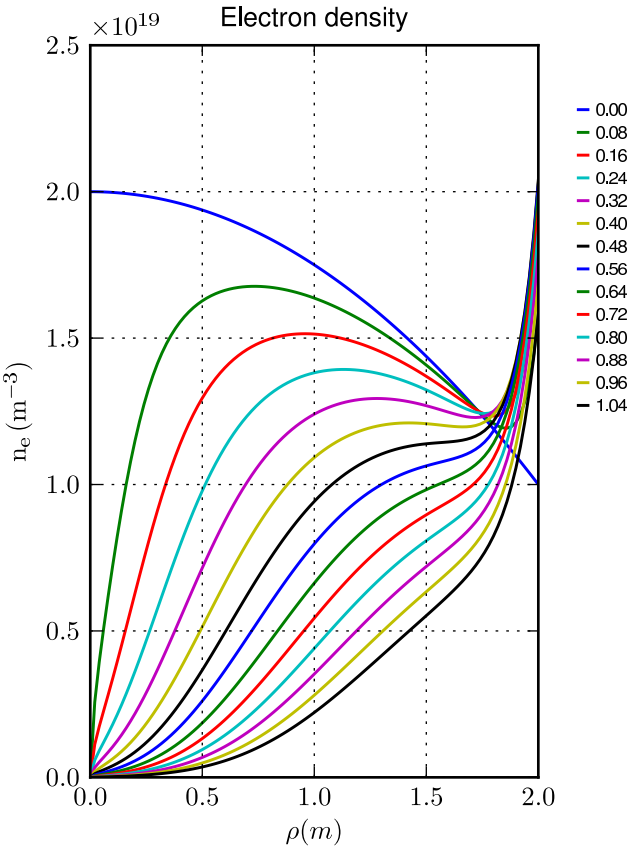


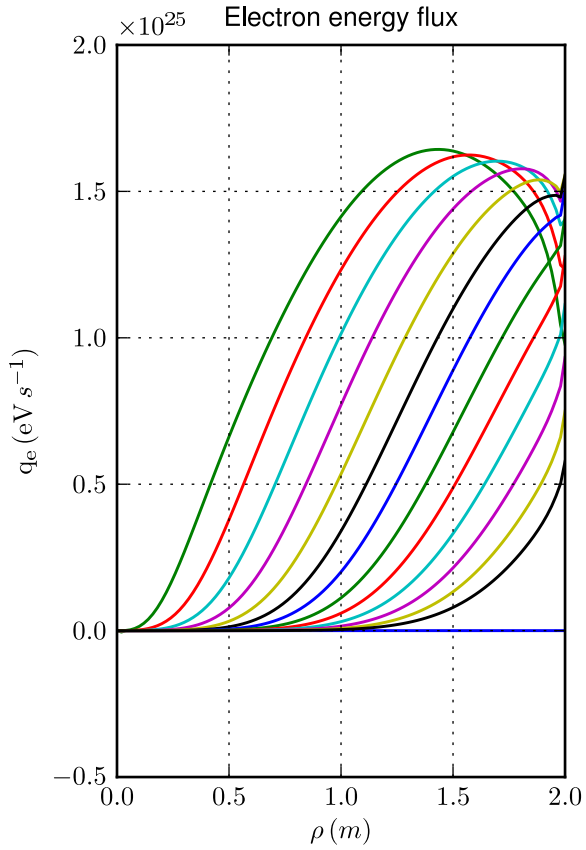
Profiles

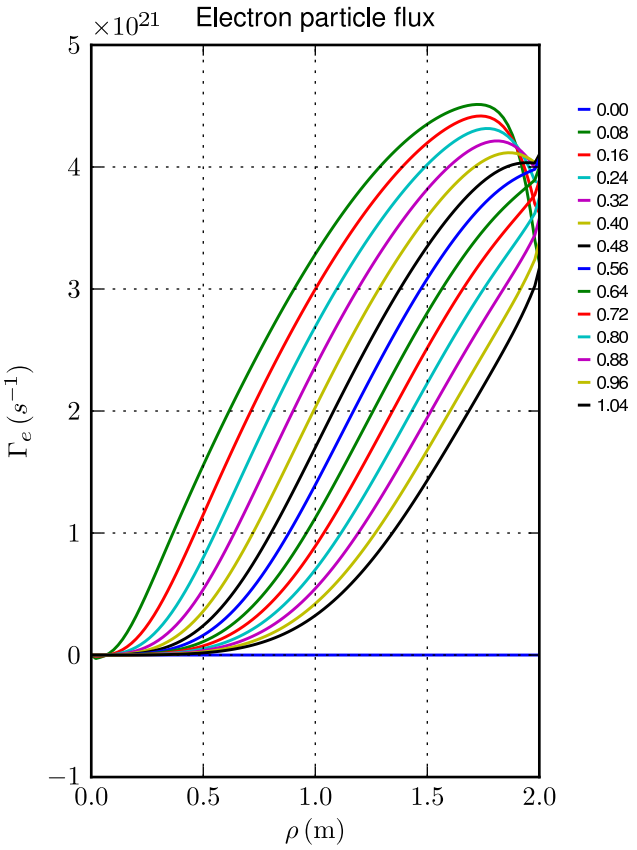
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: total simulation time/10







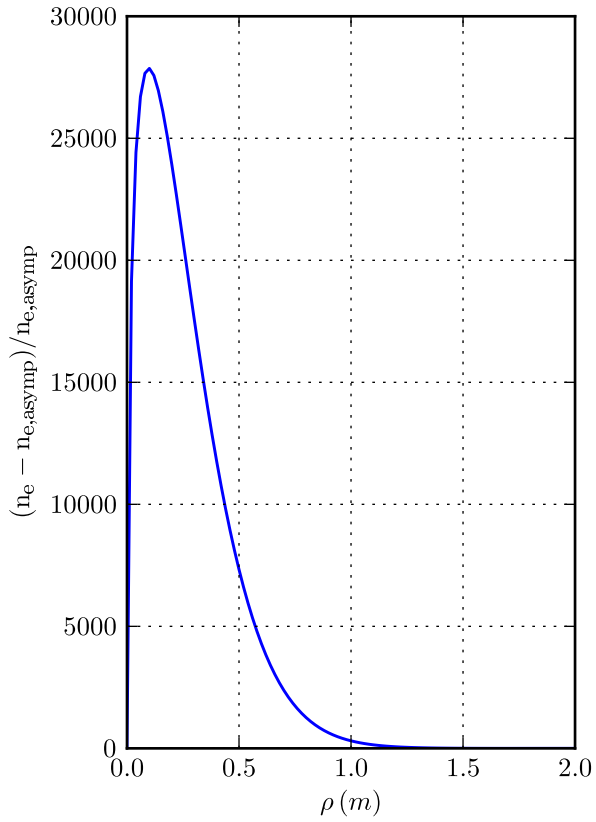


Profiles

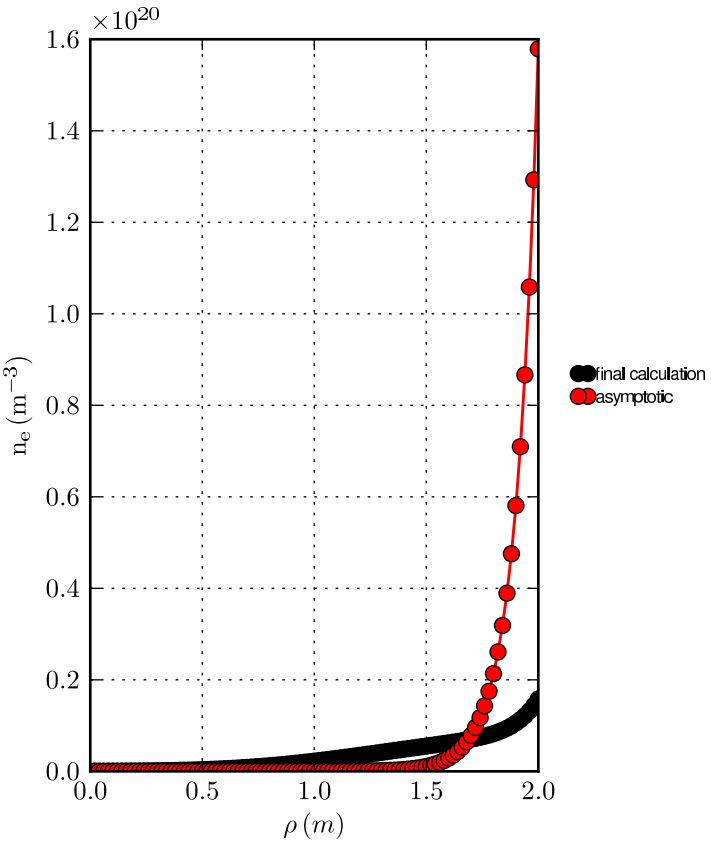
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Comparison with asymptotic solution

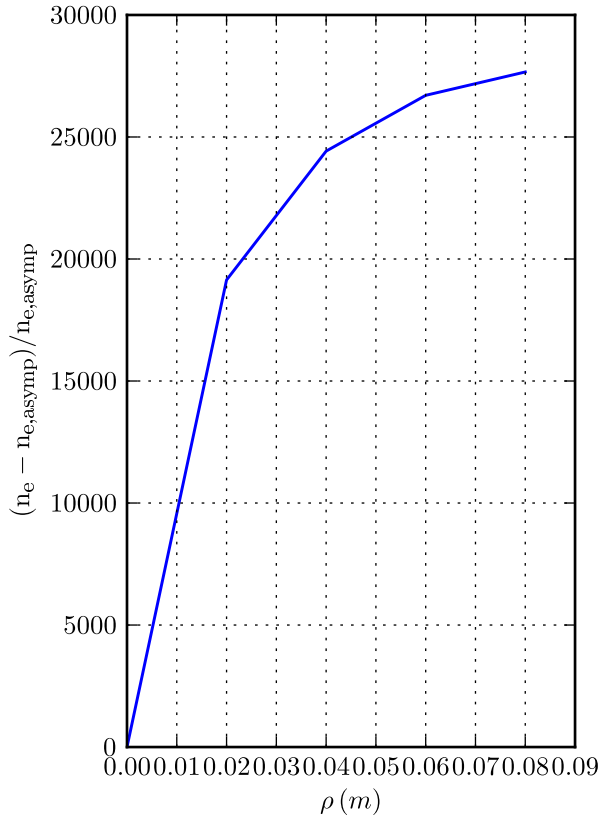
Electron density relative error



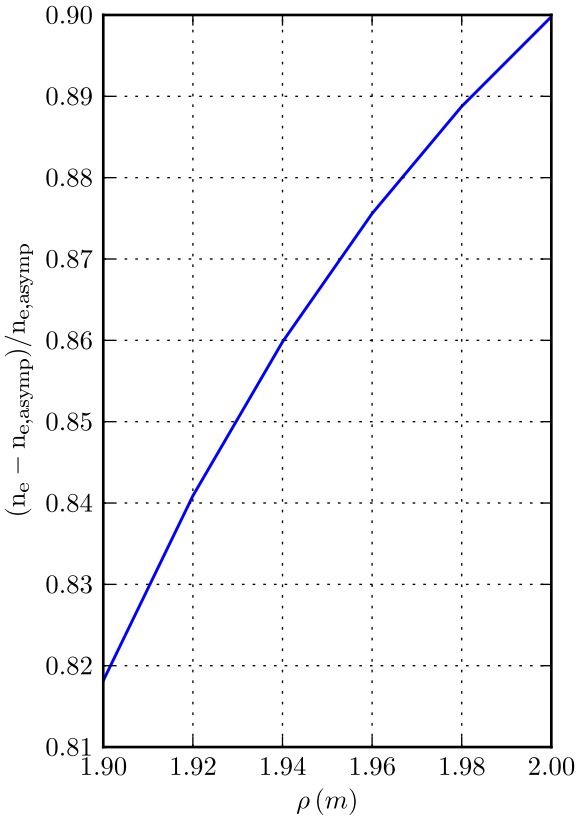
Electron density



Error: zoom over axis



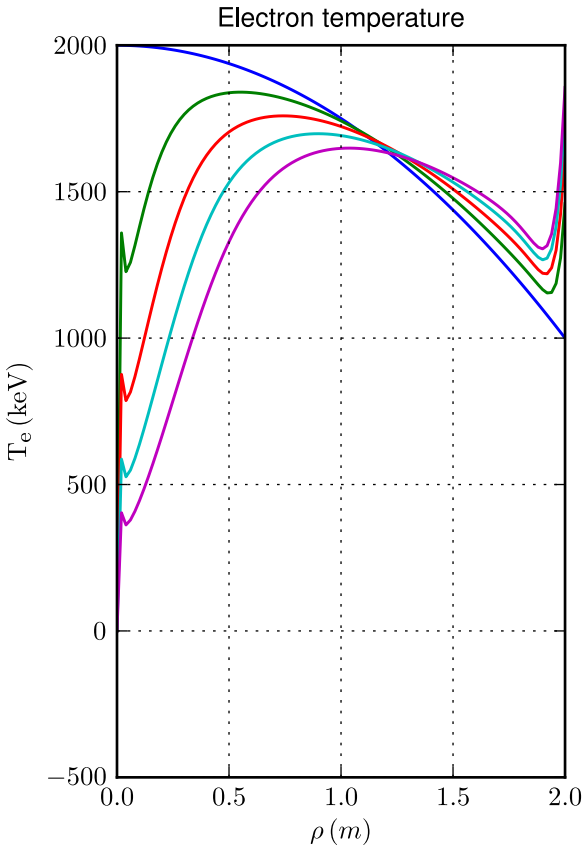
Error: zoom over edge

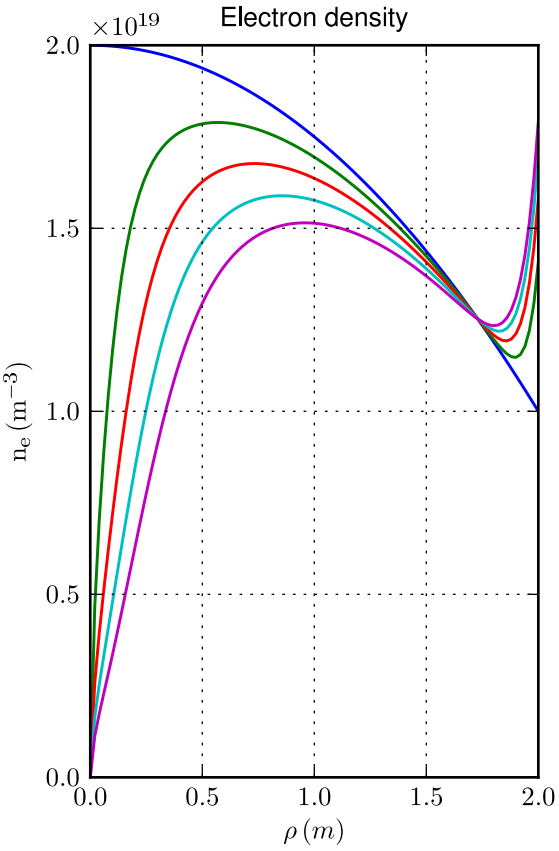


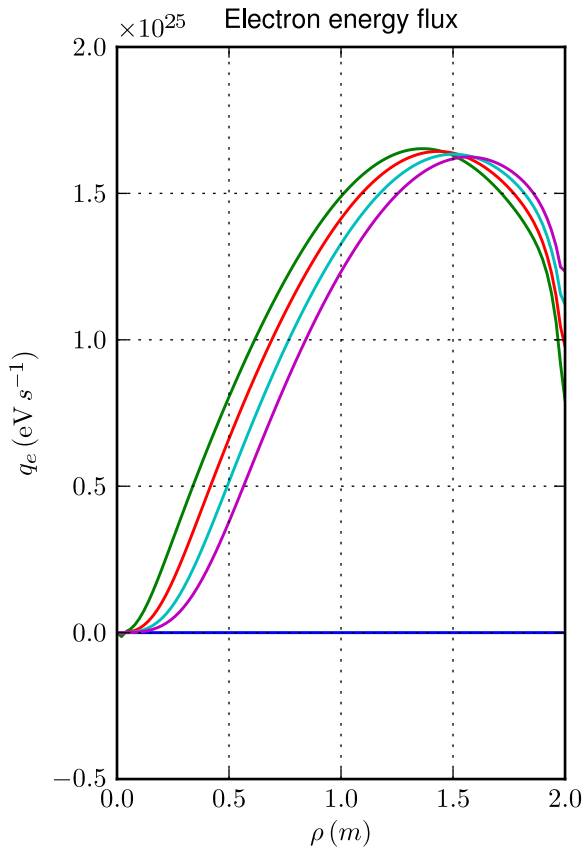
Profiles

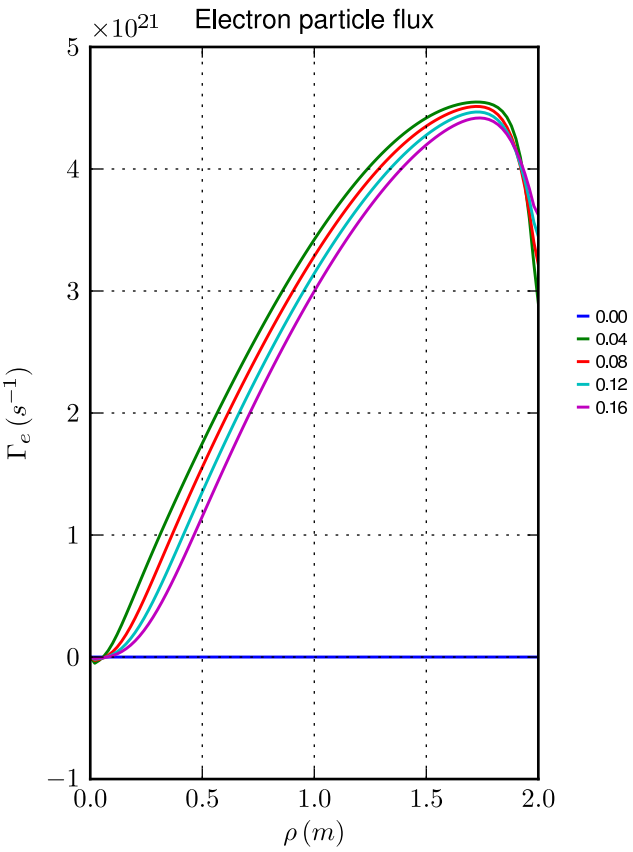
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







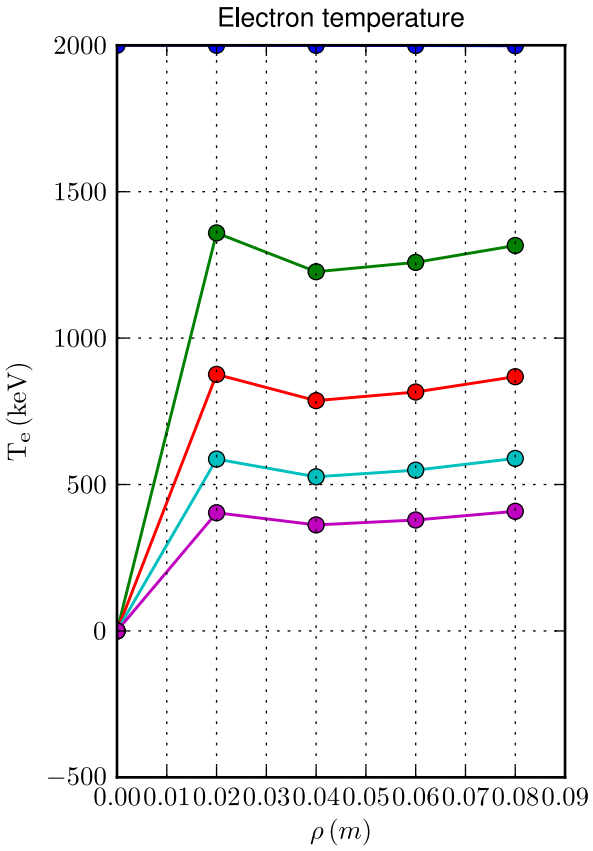


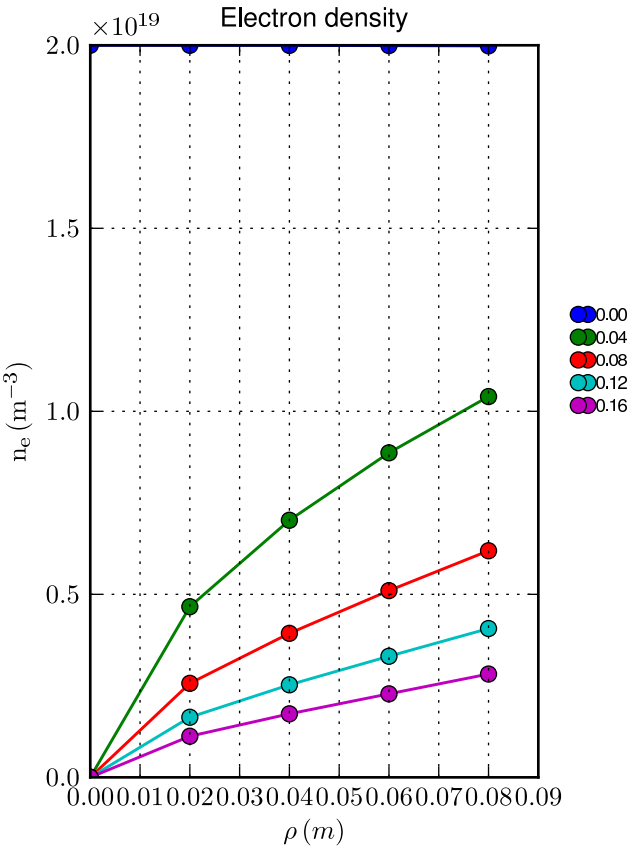
Profiles

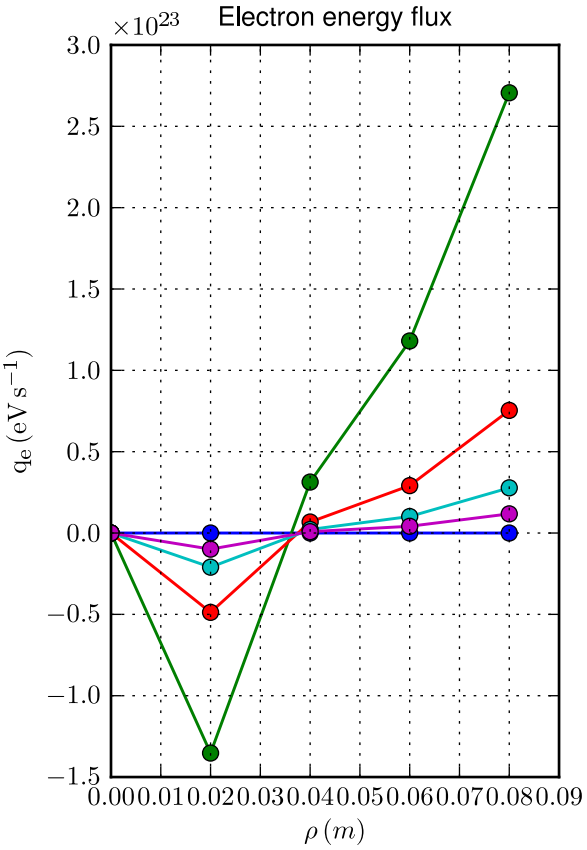
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

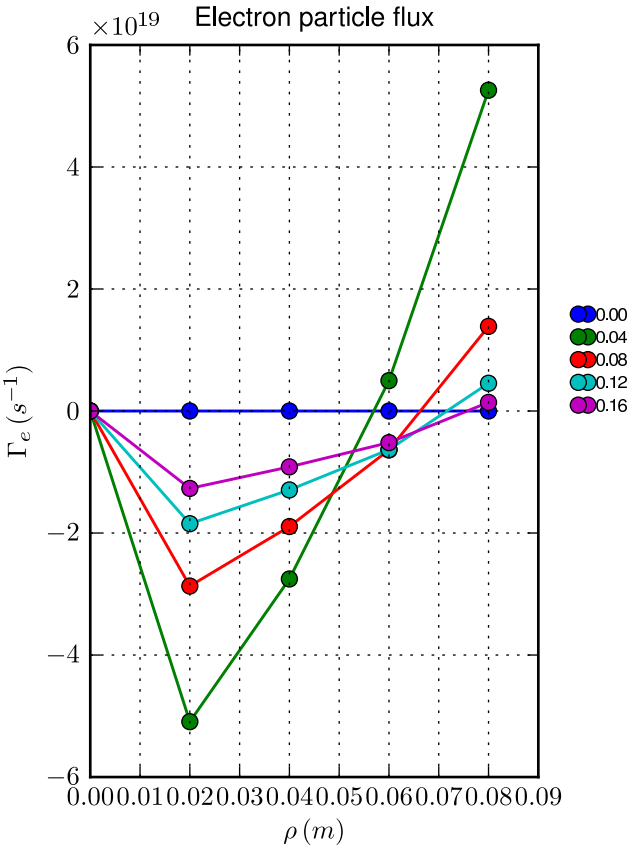
Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s







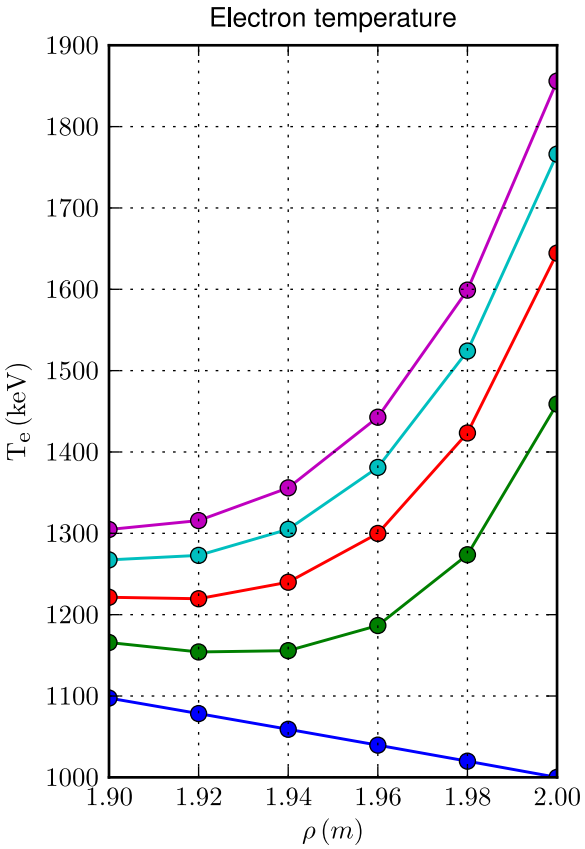


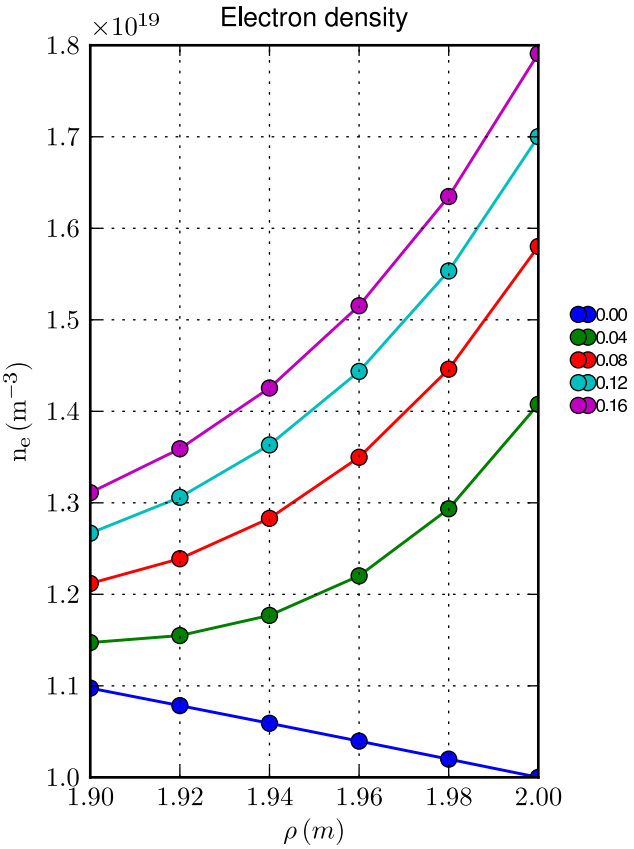
Profiles

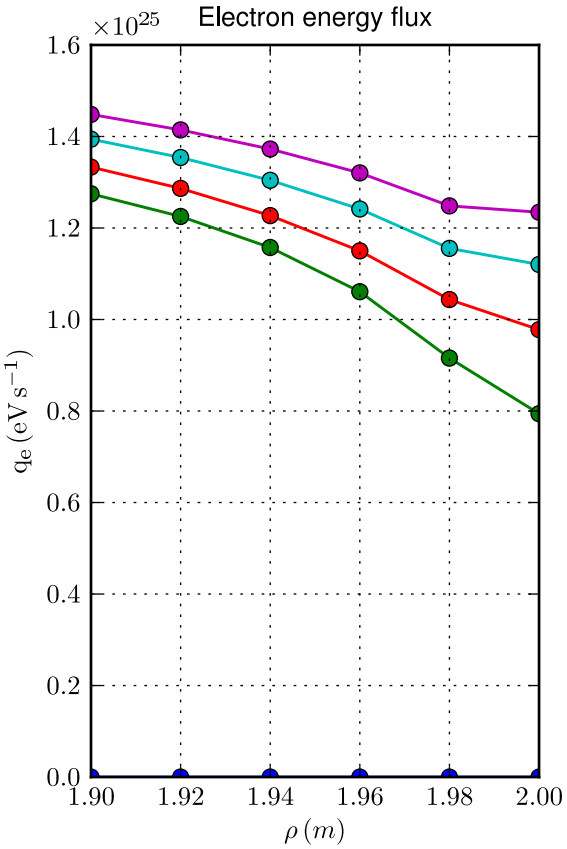
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

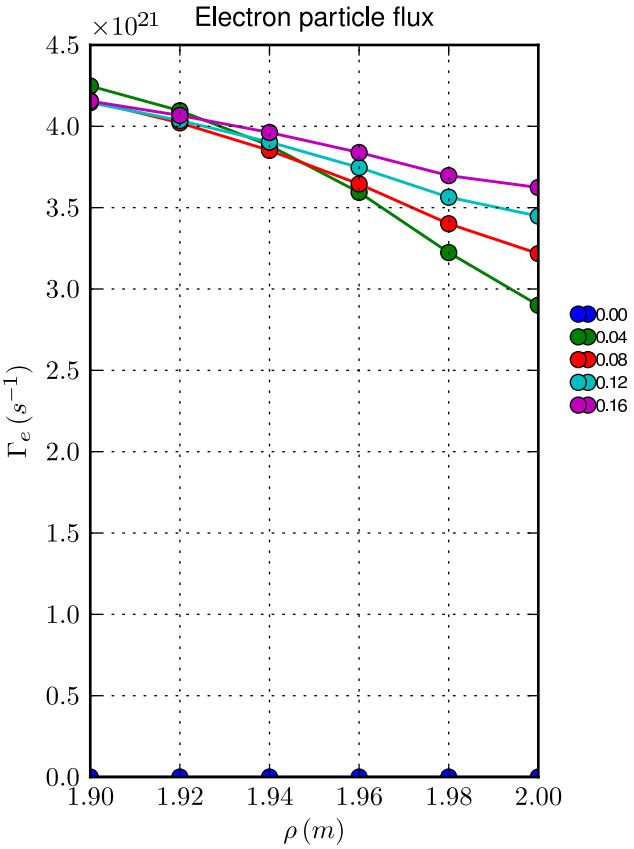
Spatial zoom over edge

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)|$ =0.21 s





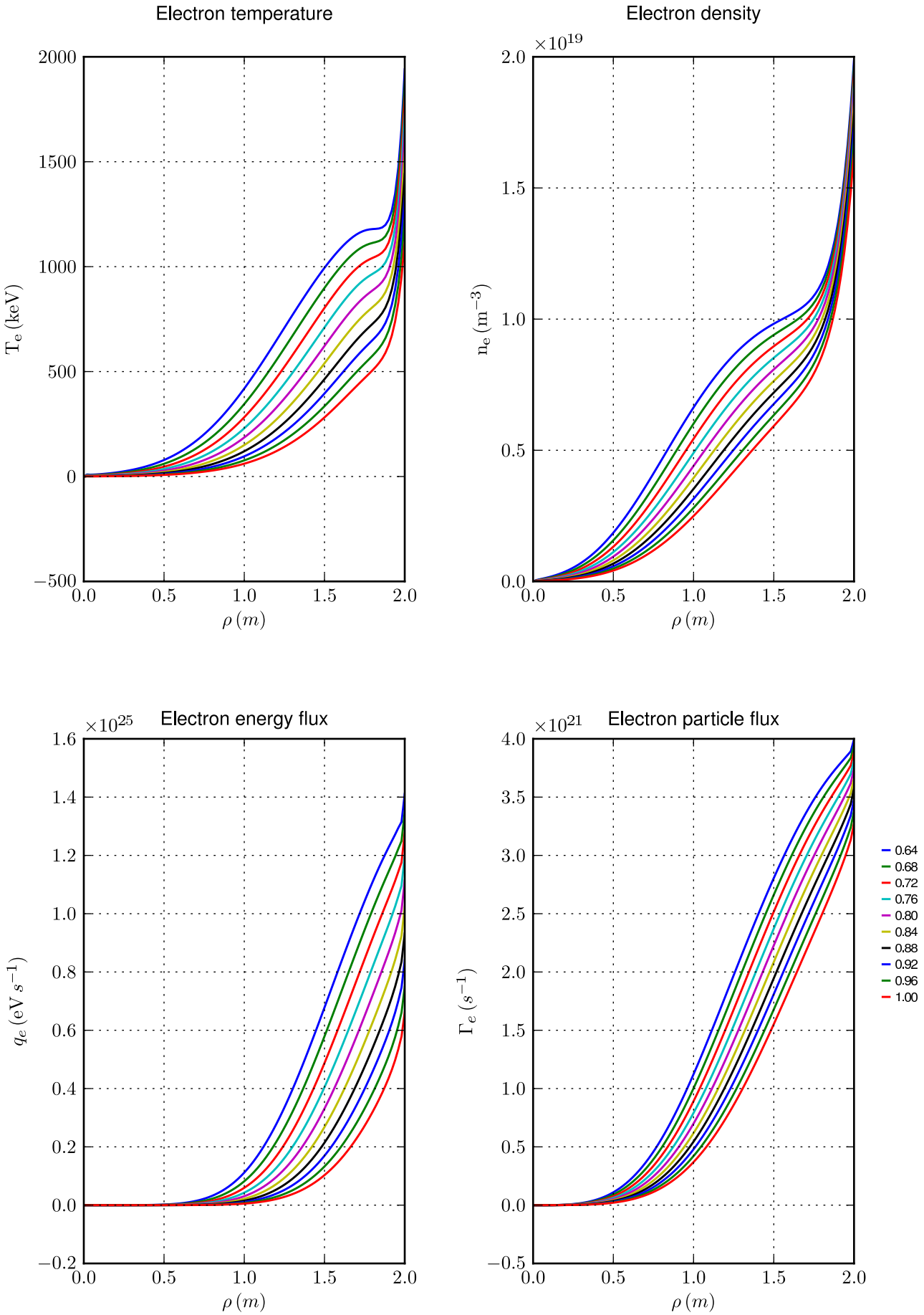




Profiles

[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Time sampling: last 10 time slices

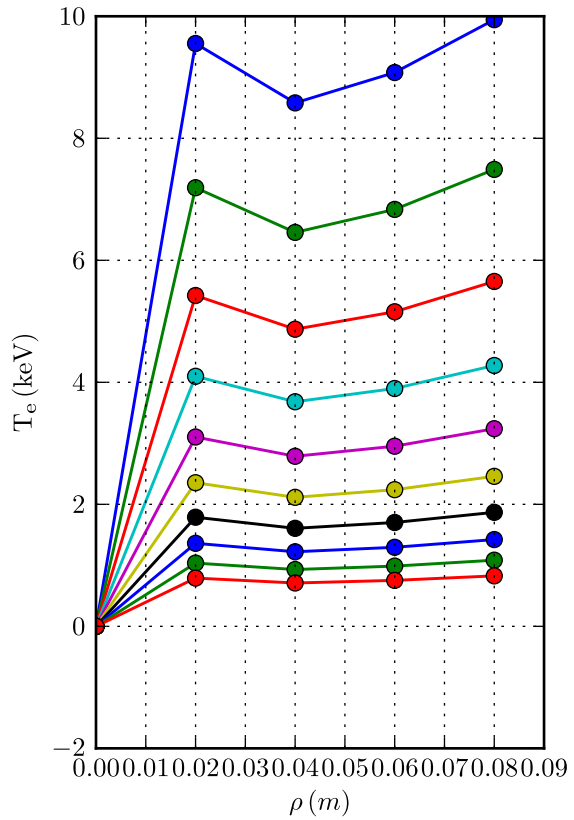


Profiles

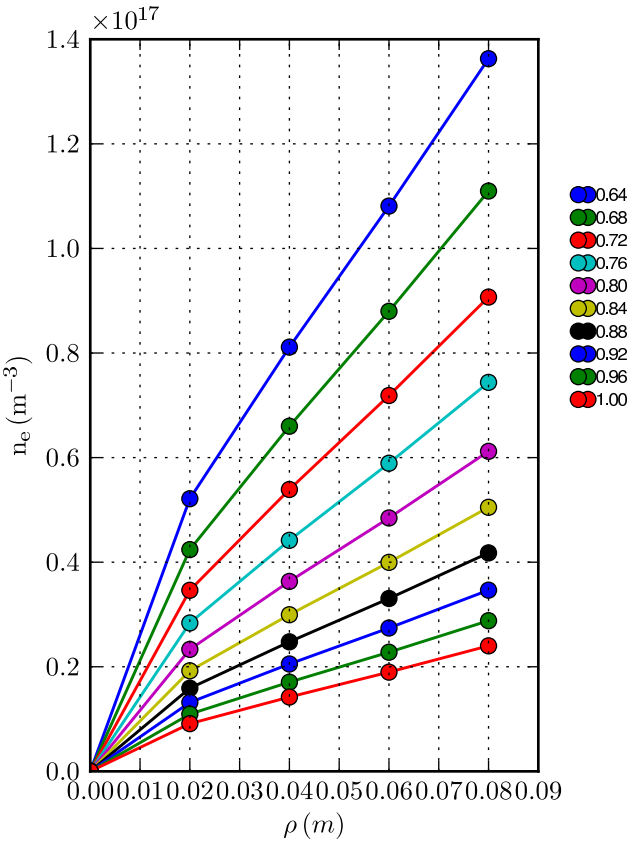
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m}^2/\mathrm{s}$, $v = 1.00\,\mathrm{m}/\mathrm{s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Spatial zoom over magnetic axis; time sampling: last 10 time slices

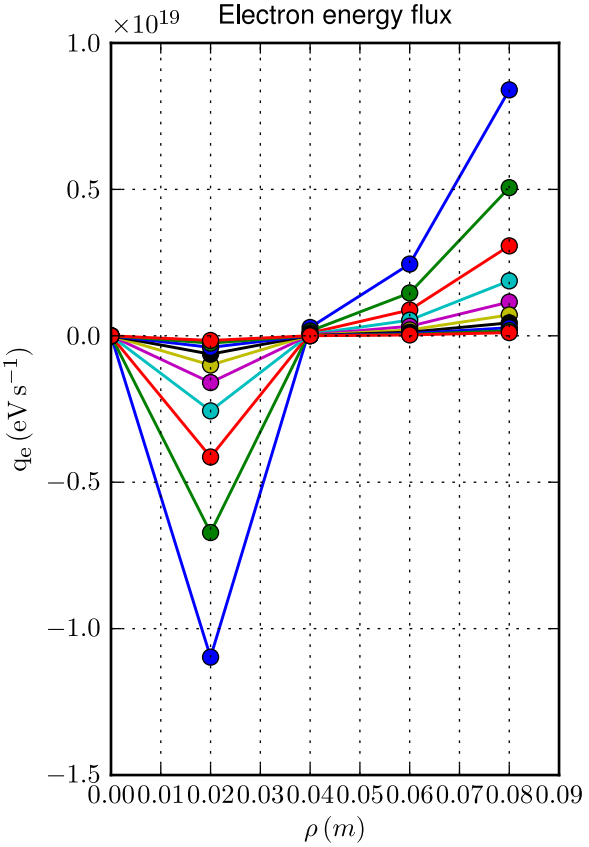
Electron temperature



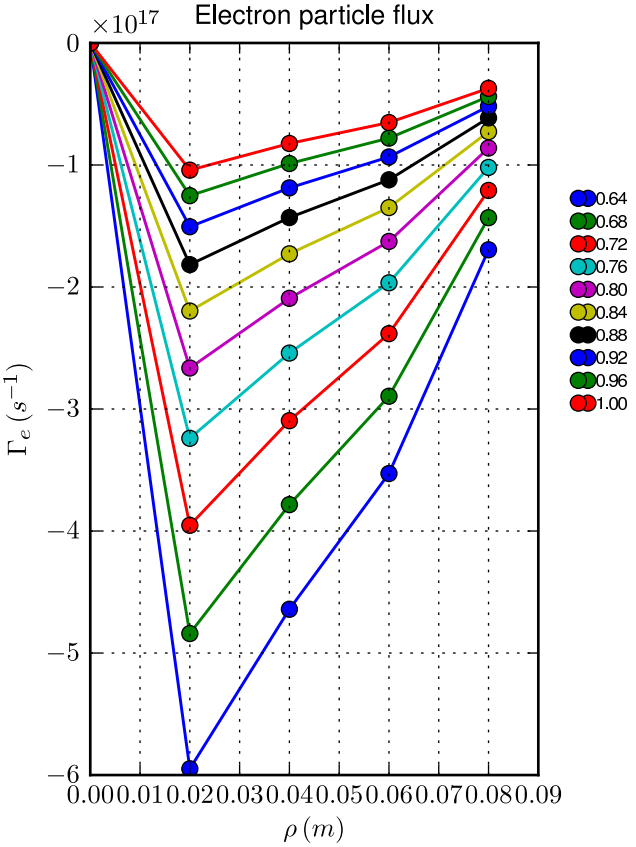
Electron density



Electron energy flux



Electron particle flux

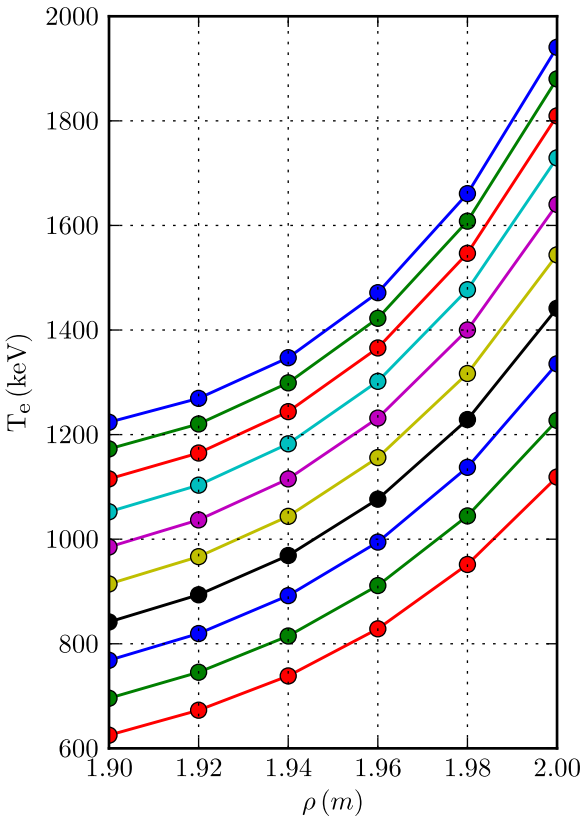


Profiles

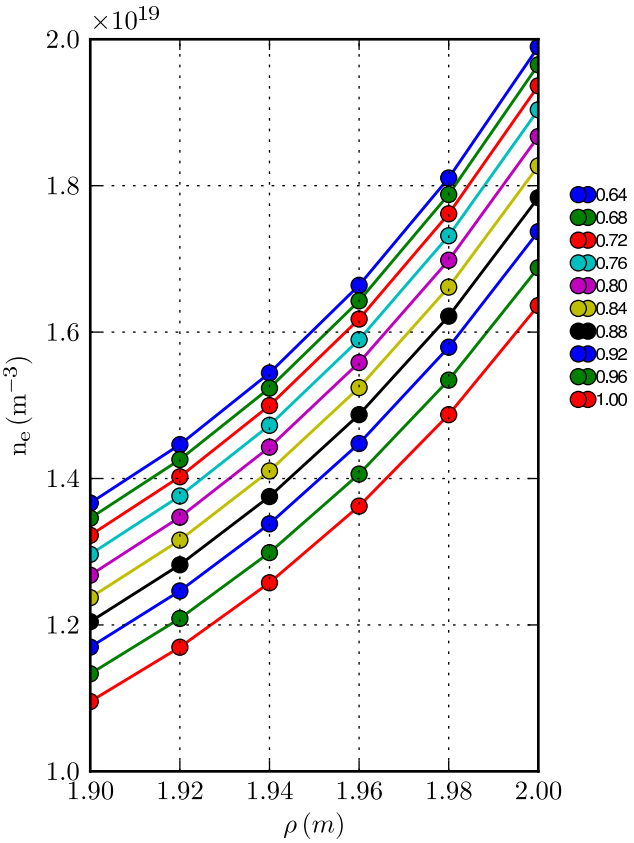
[Case: I.1.5.c, Solver: 10, $D = 0.1\,\mathrm{m^2/s}$, $v = 1.00\,\mathrm{m/s}$, Δt = 4.01, $\tau = 1.0 \times 10^{-2}\,\mathrm{s}$, $N_\rho = 101$]

Spatial zoom over edge; time sampling: last 10 time slices

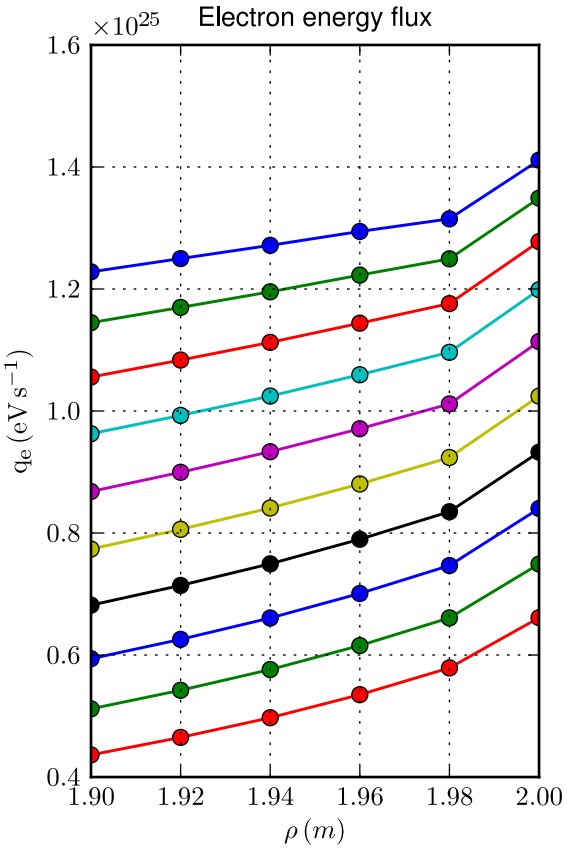
Electron temperature



Electron density



Electron energy flux



Electron particle flux