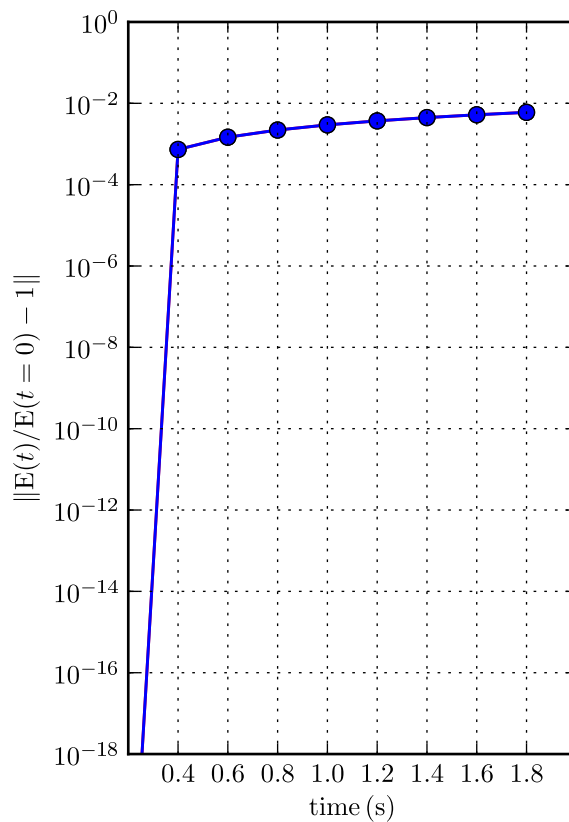
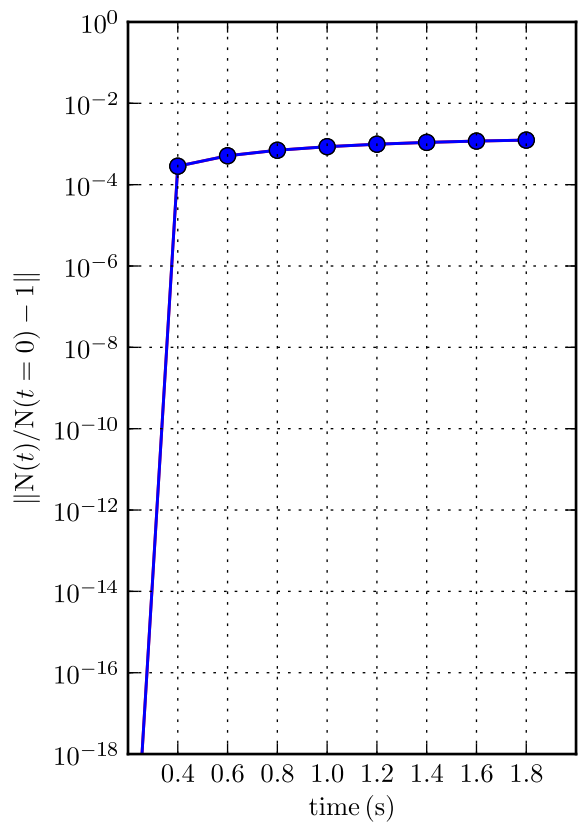
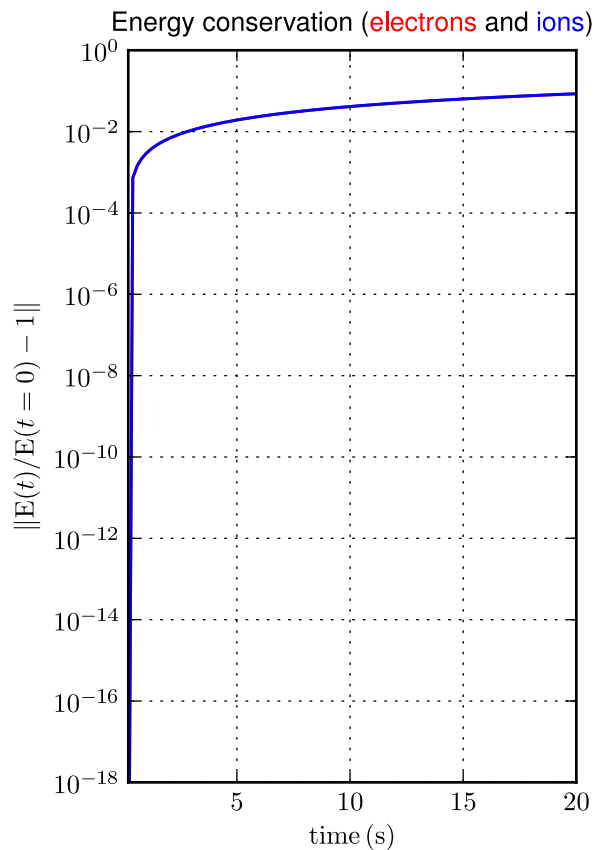
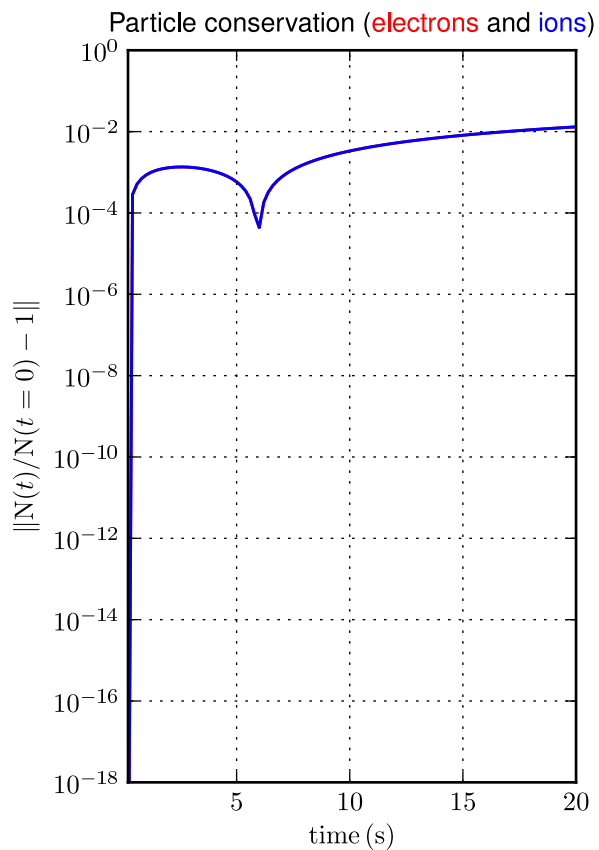


Part. & Energy conservation

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

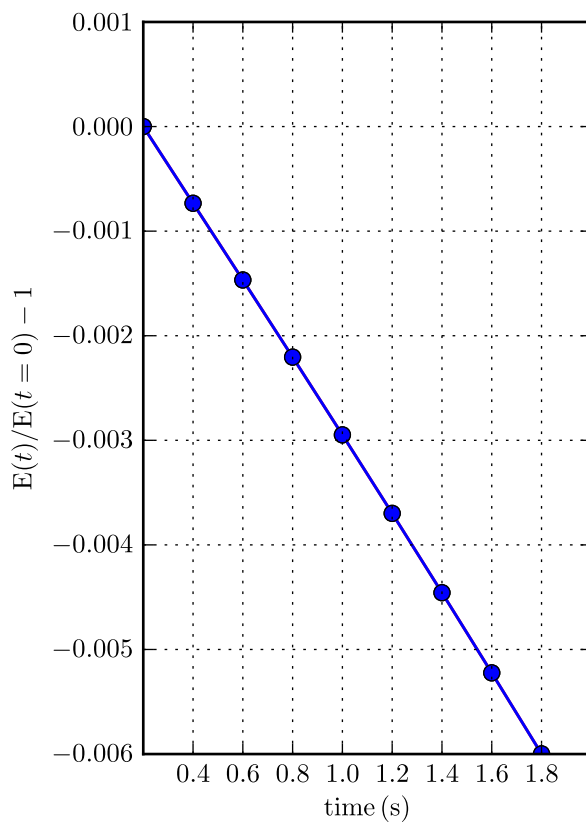
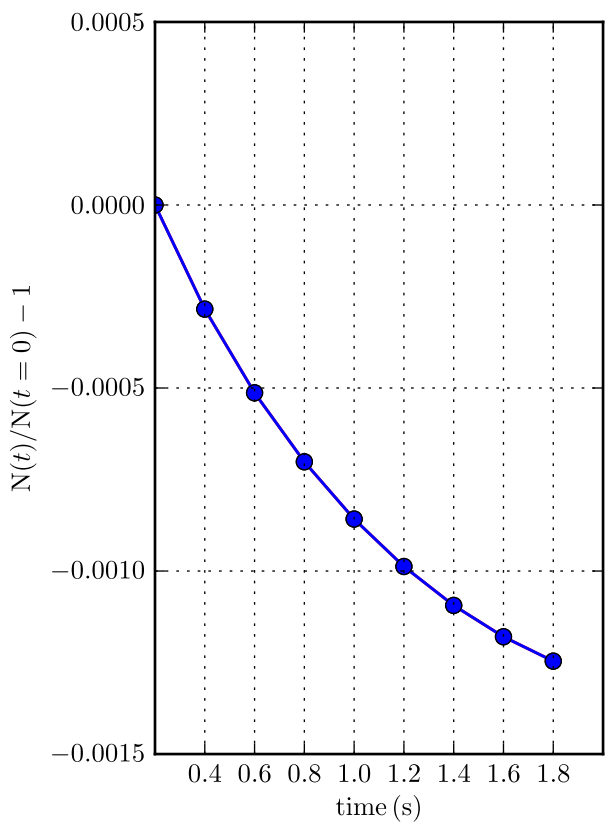
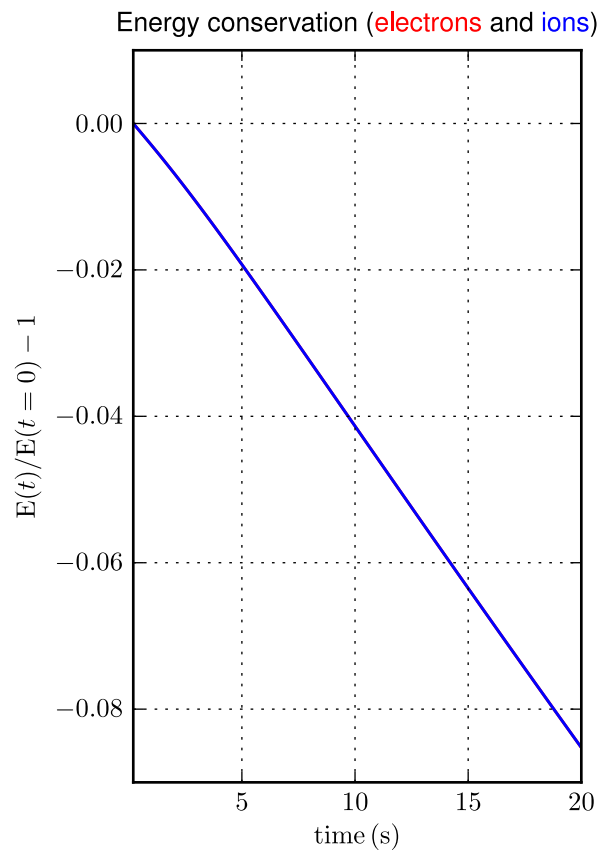
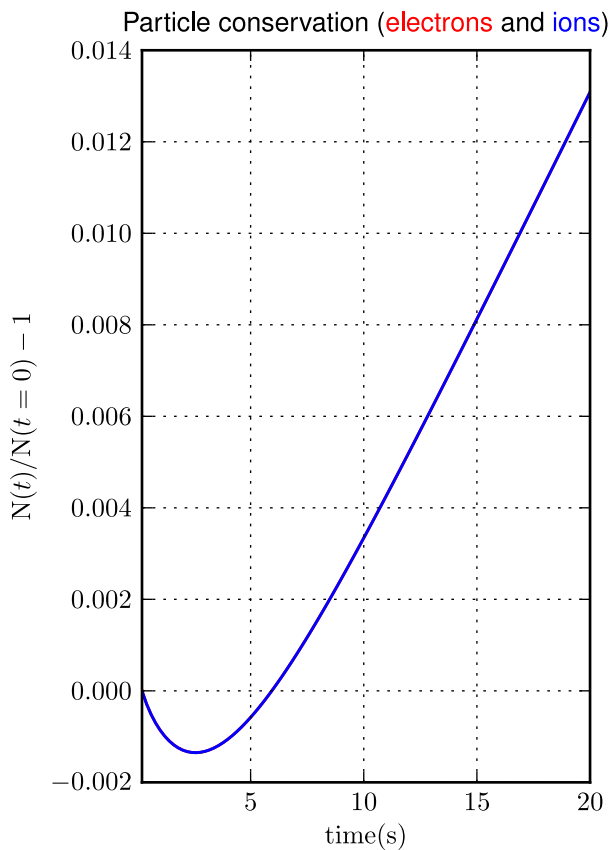
Comparison with initial solution - log scale; total time and zoom over time



Part. & Energy conservation

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

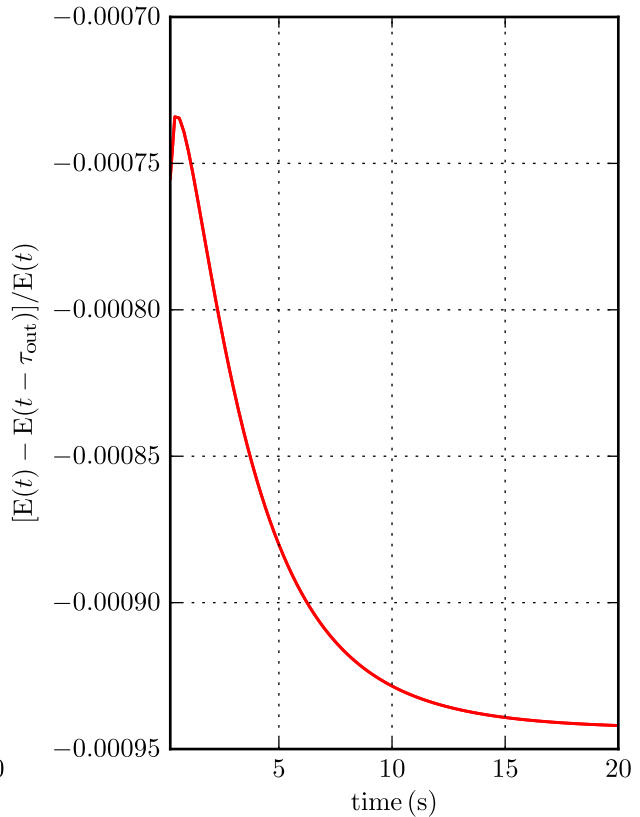
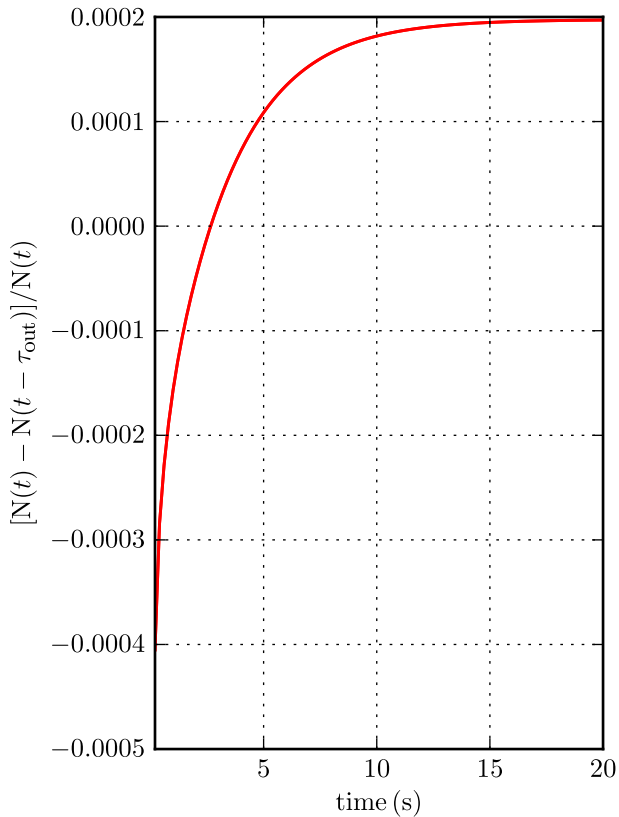
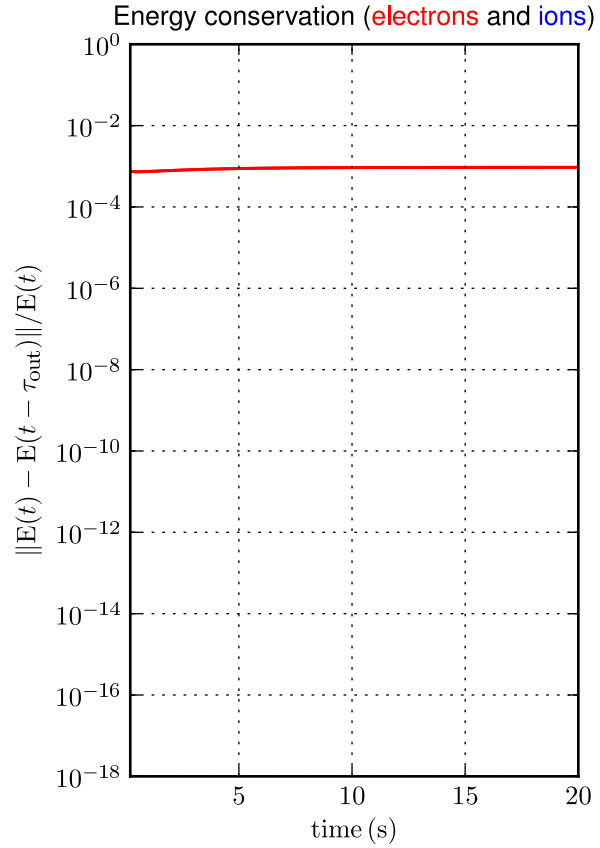
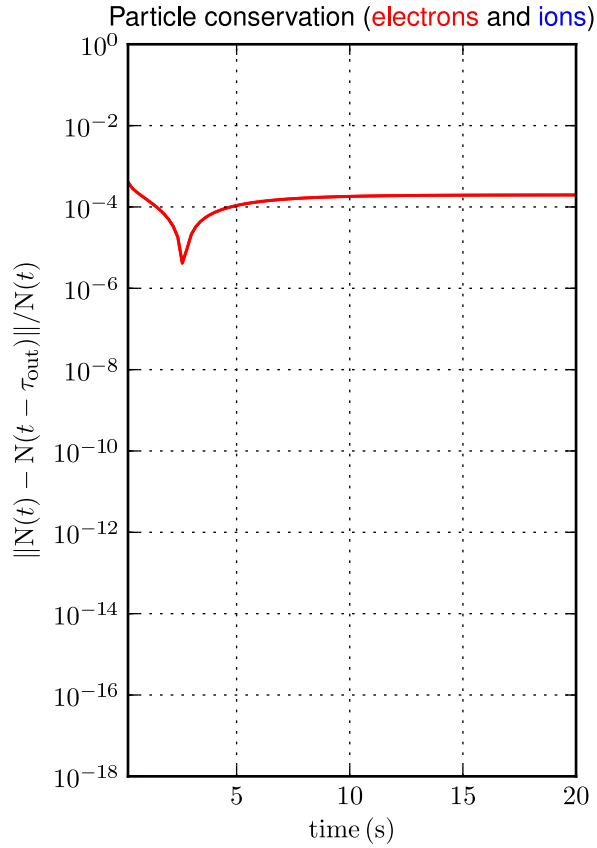
Comparison with initial solution - linear scale; total time and zoom over time



Part. & Energy conservation

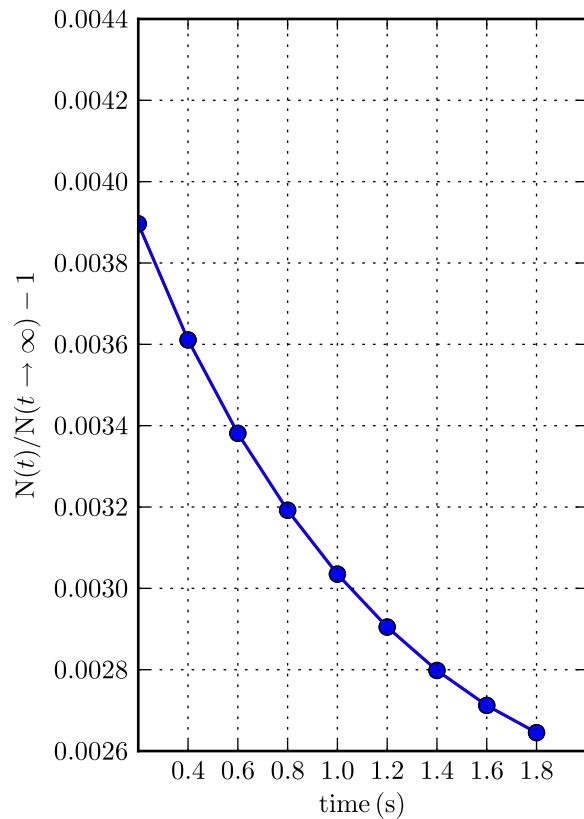
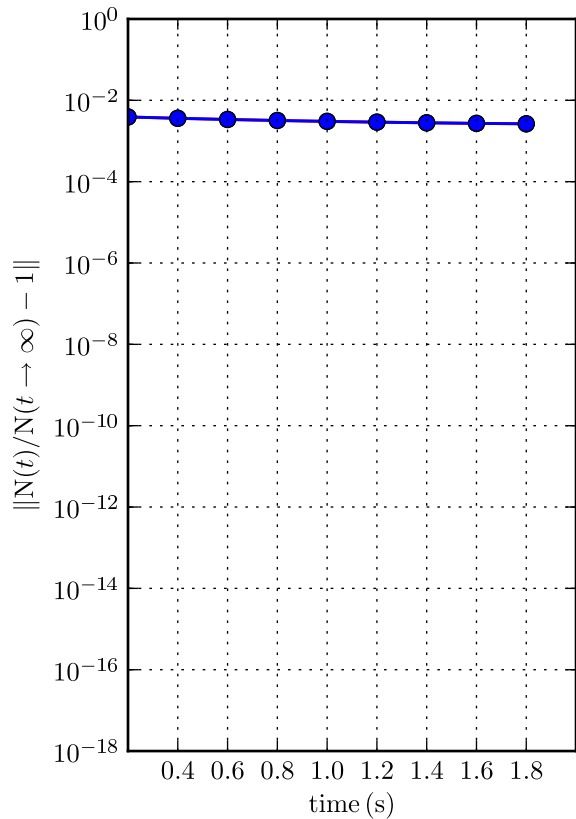
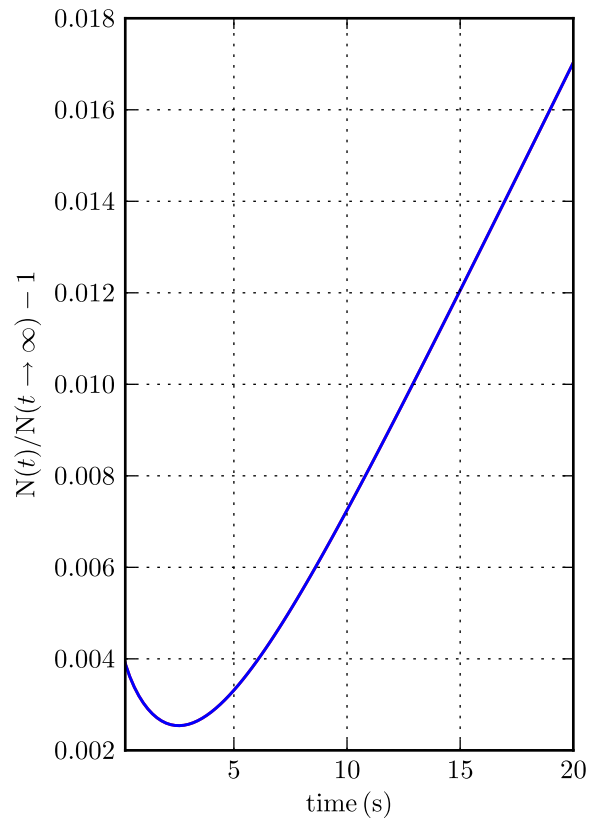
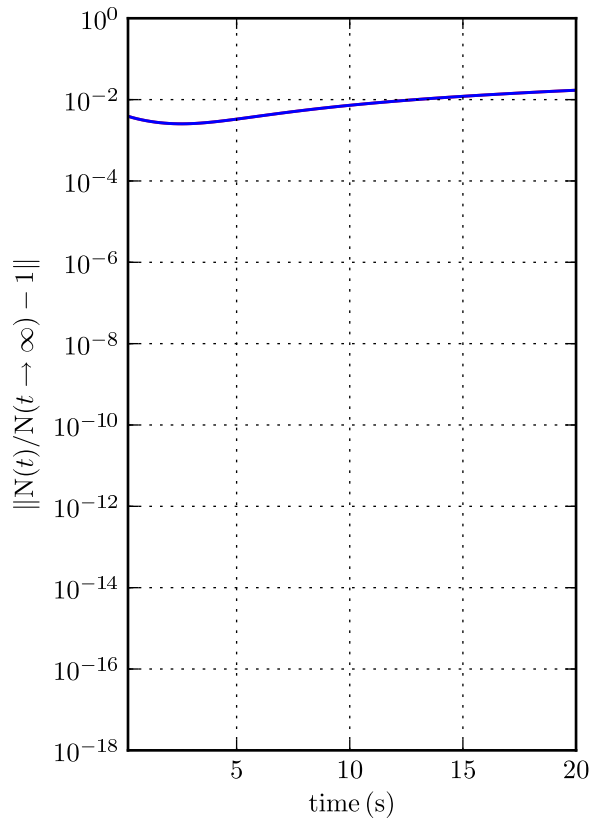
[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

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



Particle conservation

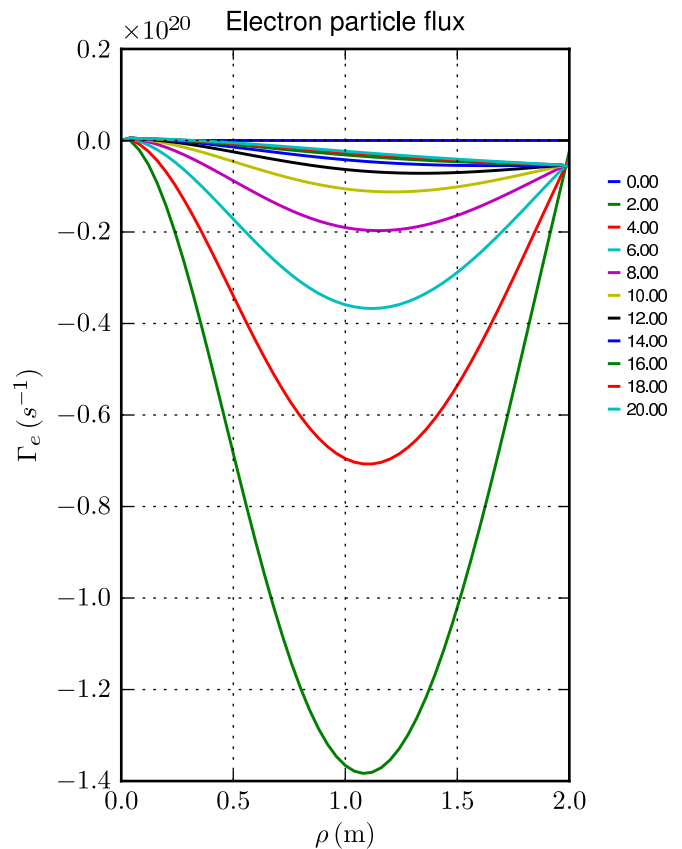
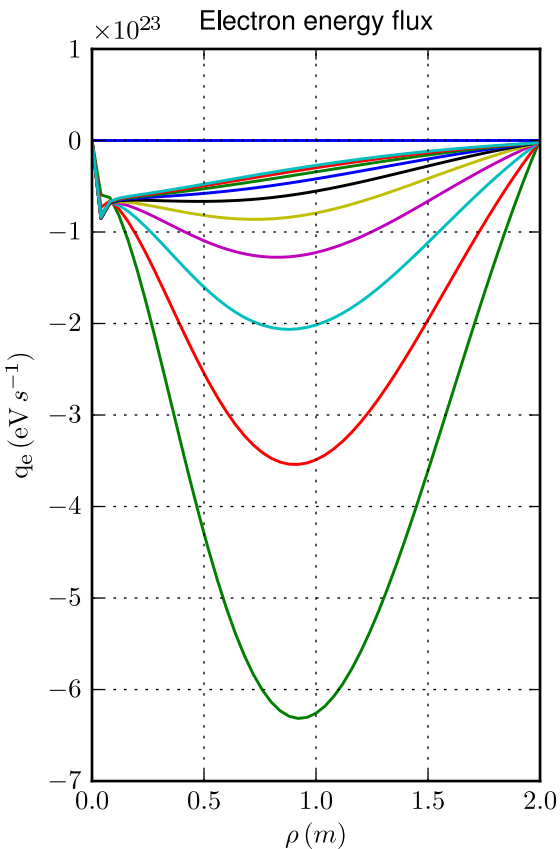
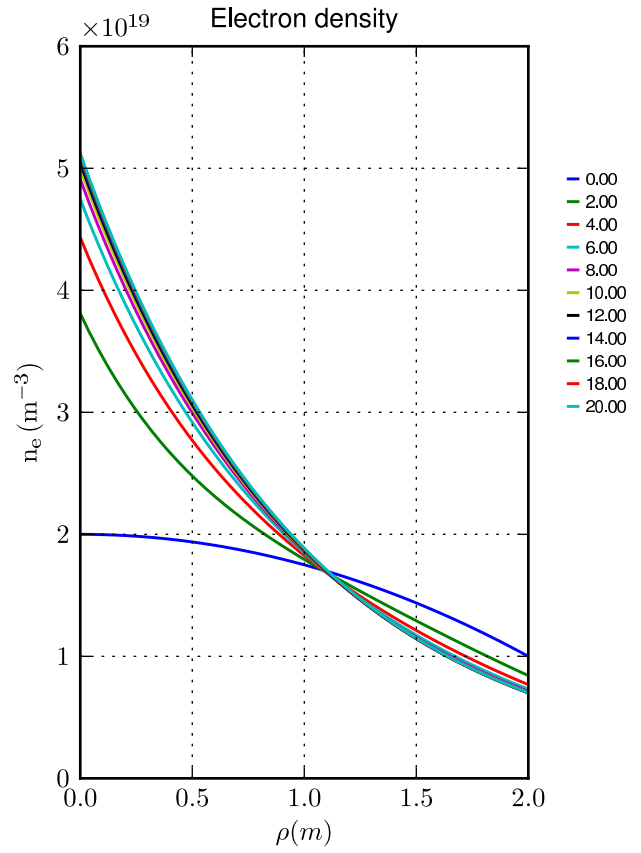
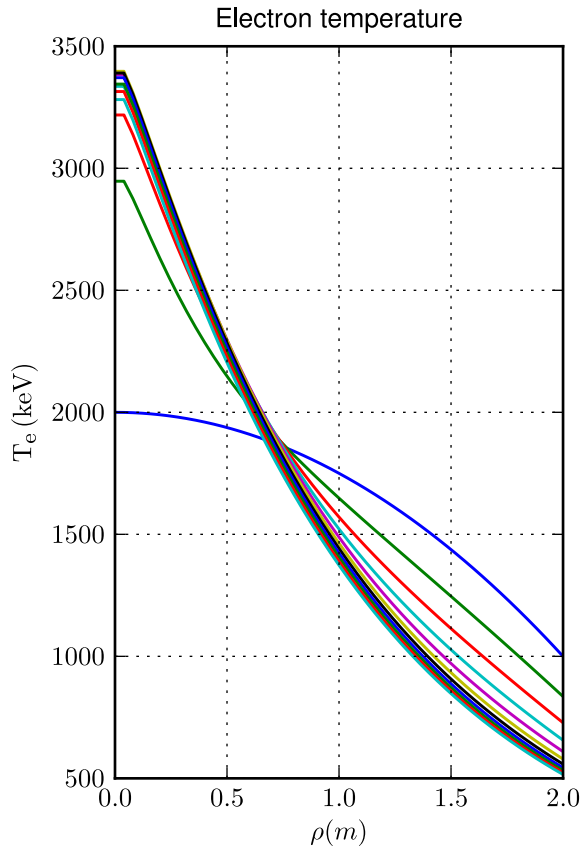
[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]
Comparison with asymptotic solution (electrons and ions); total time and zoom over time



Profiles

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Time sampling: total simulation time/10

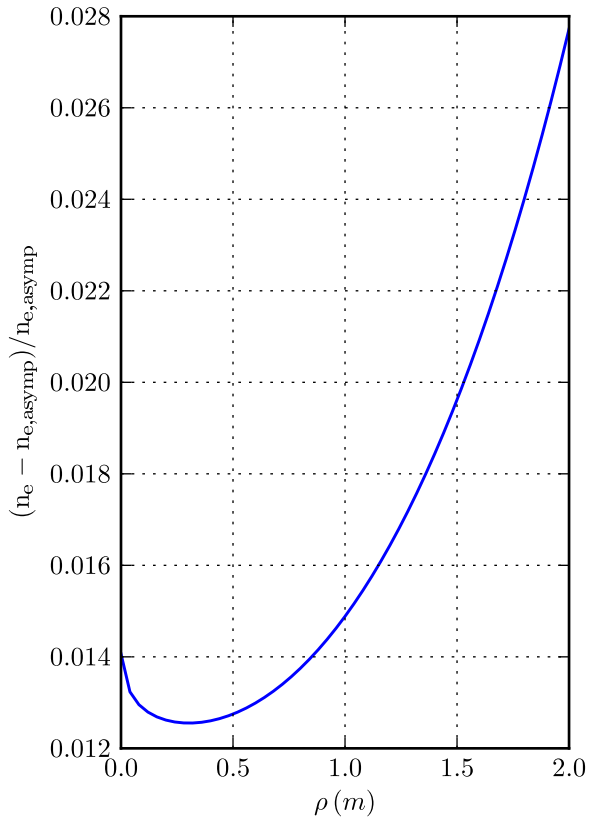


Profiles

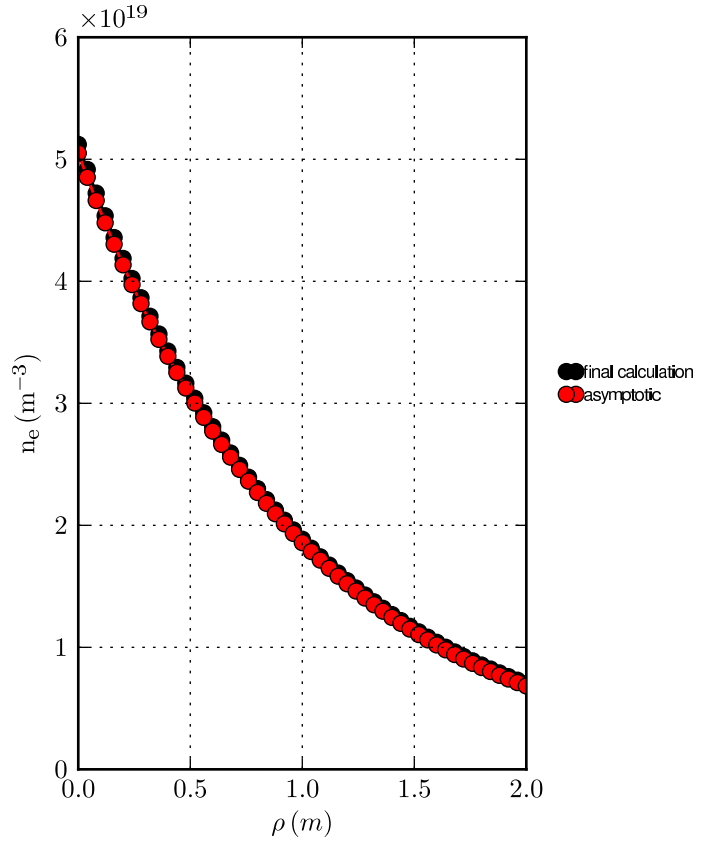
[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Comparison with asymptotic solution

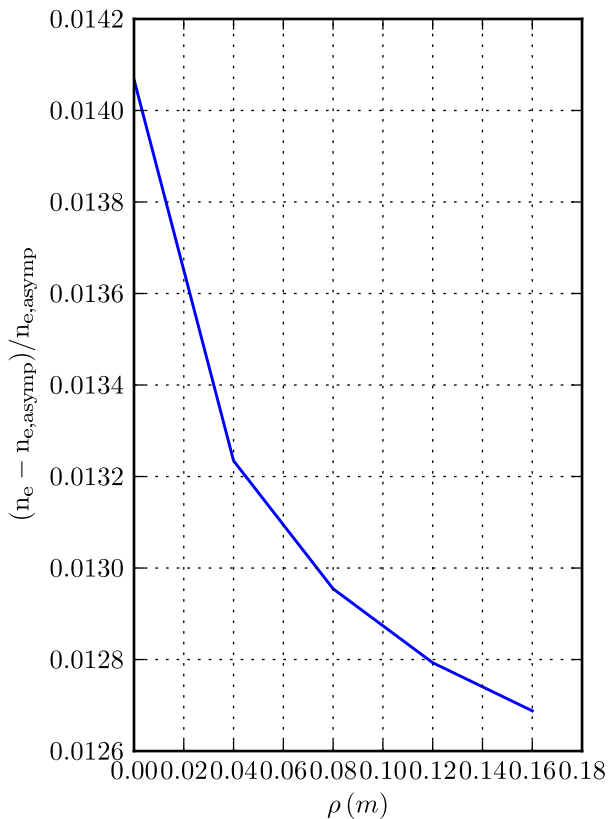
Electron density relative error



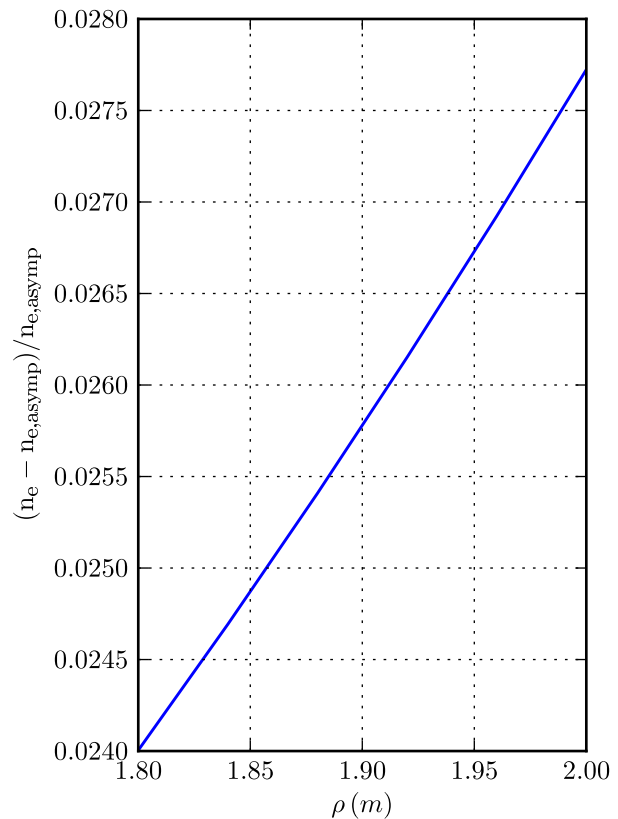
Electron density



Error: zoom over axis



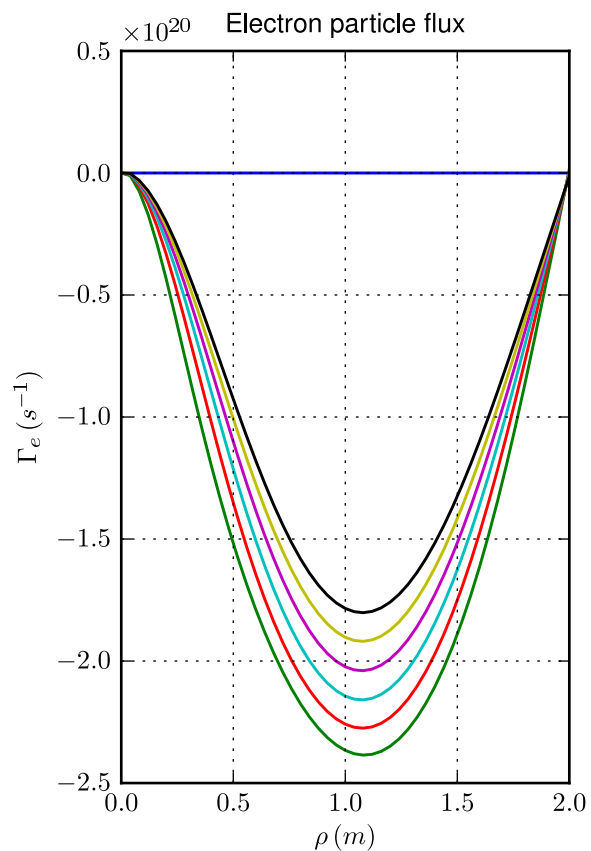
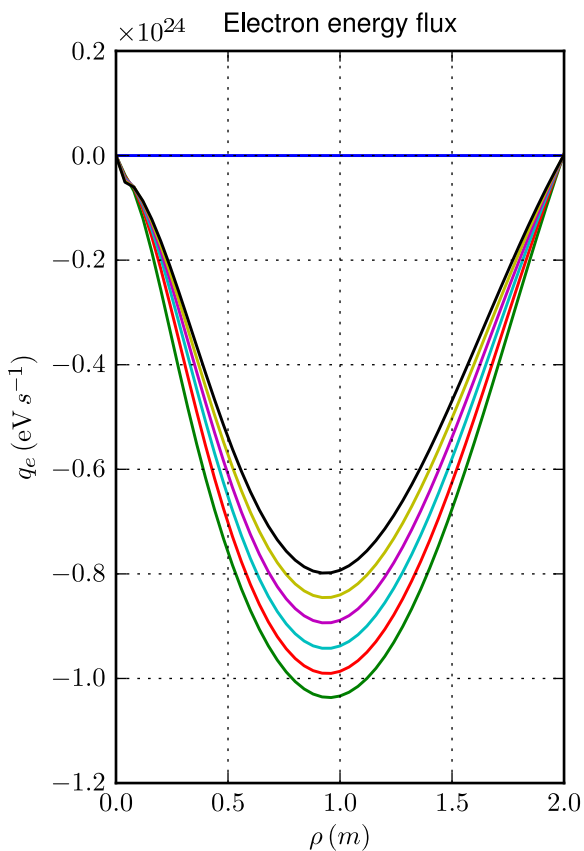
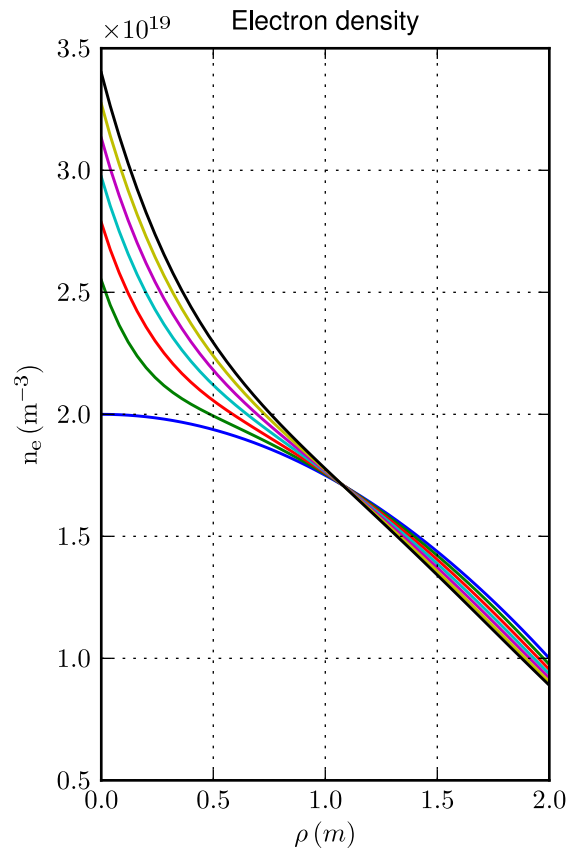
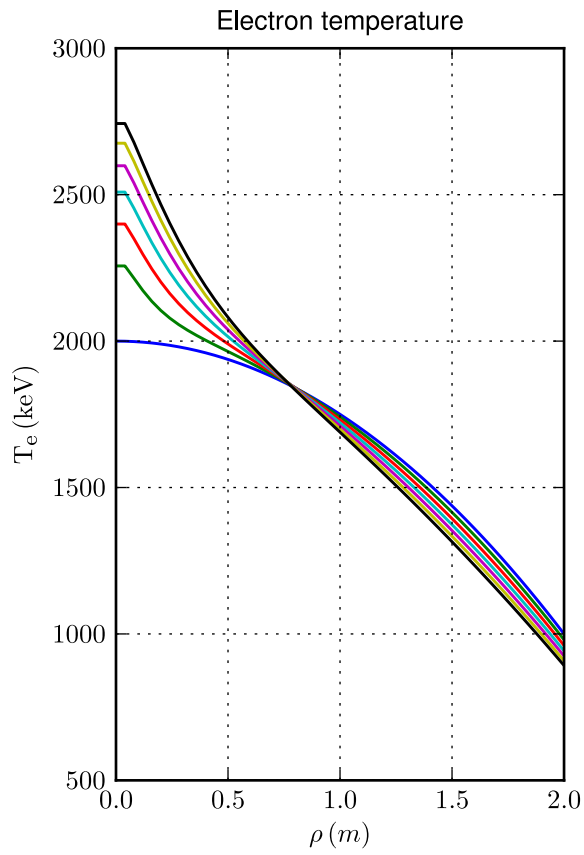
Error: zoom over edge



Profiles

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$

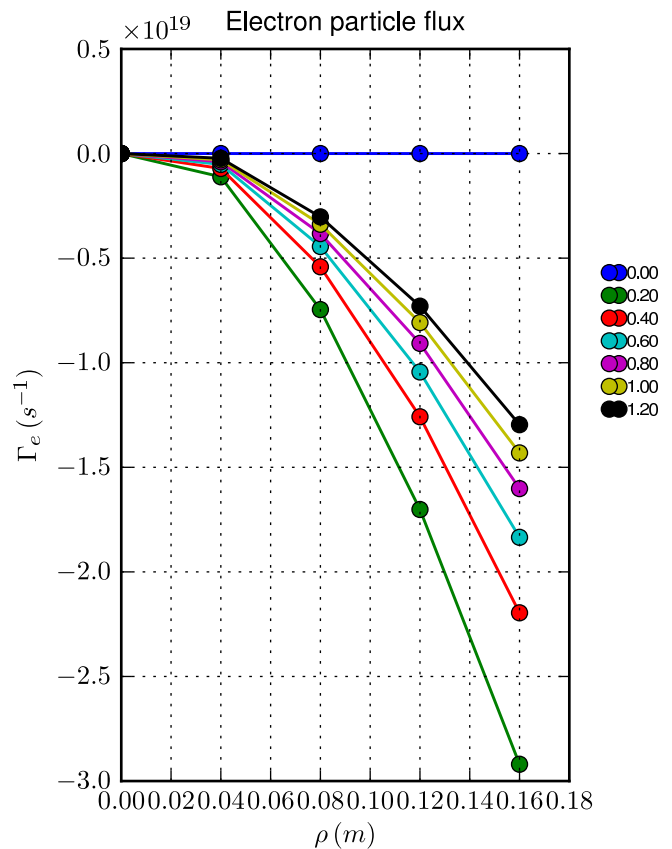
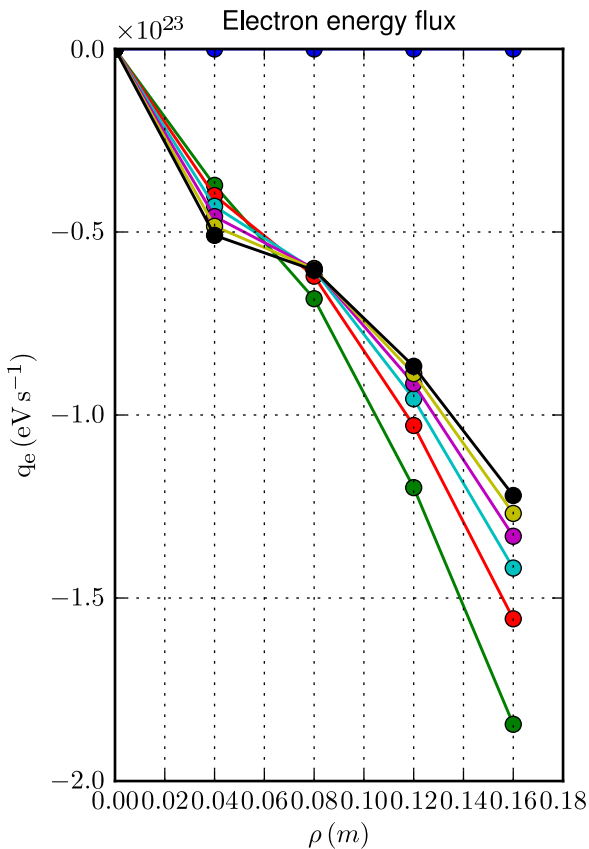
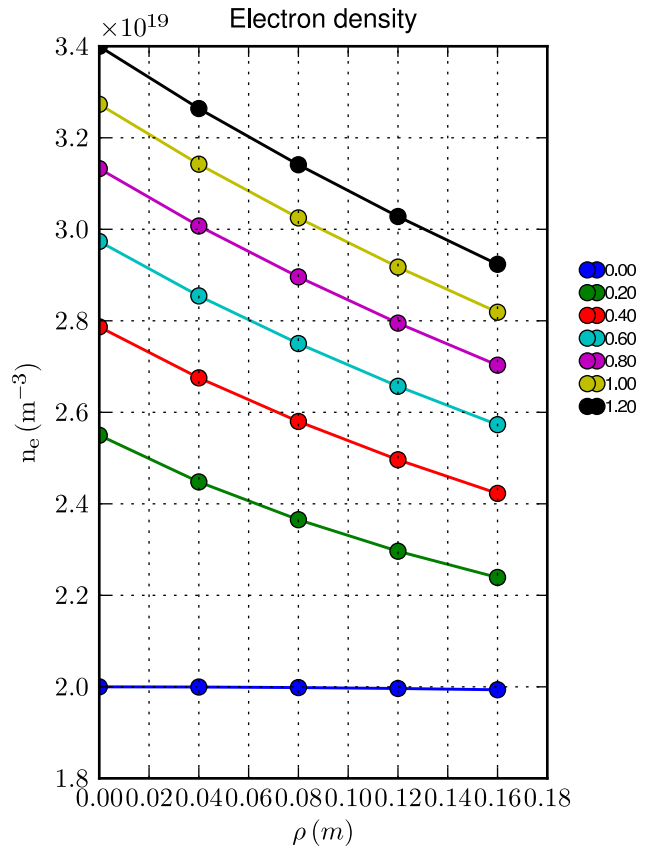
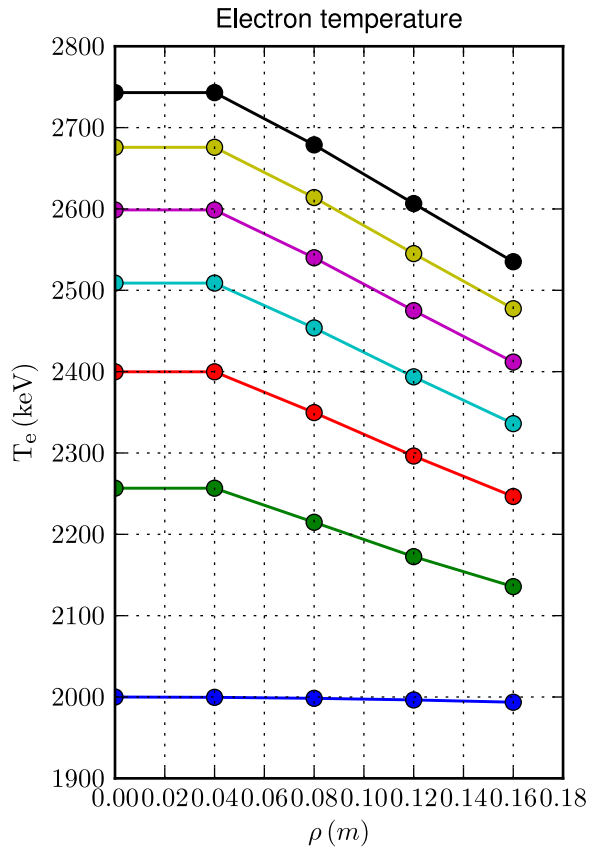


Profiles

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$

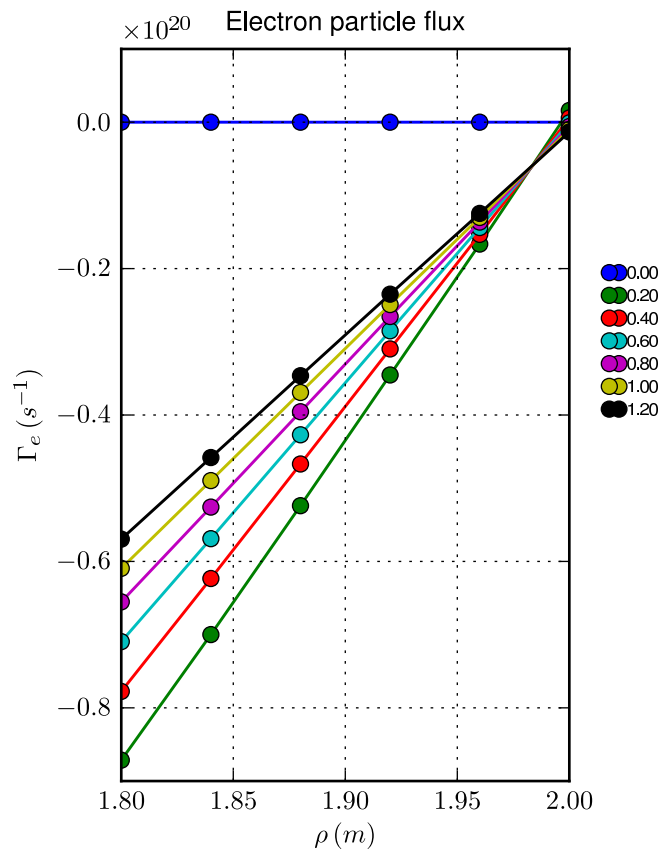
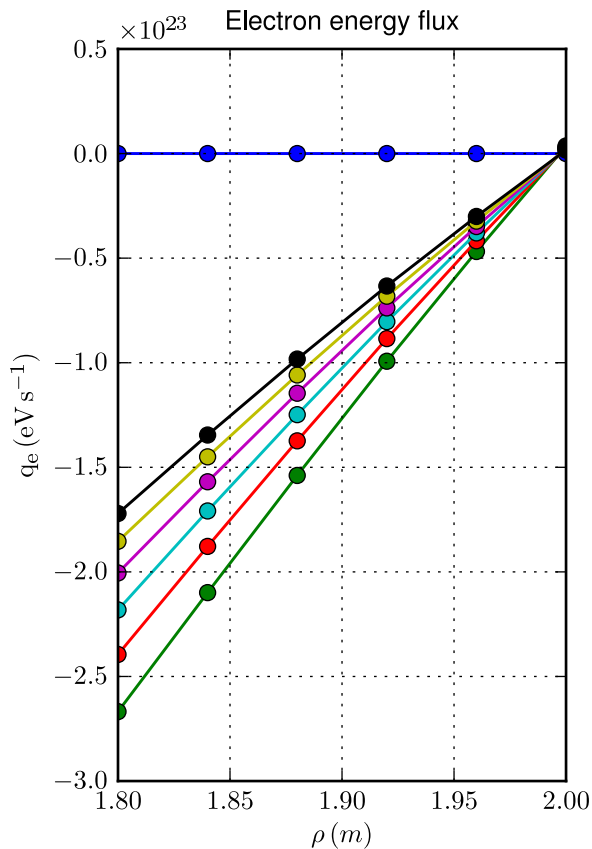
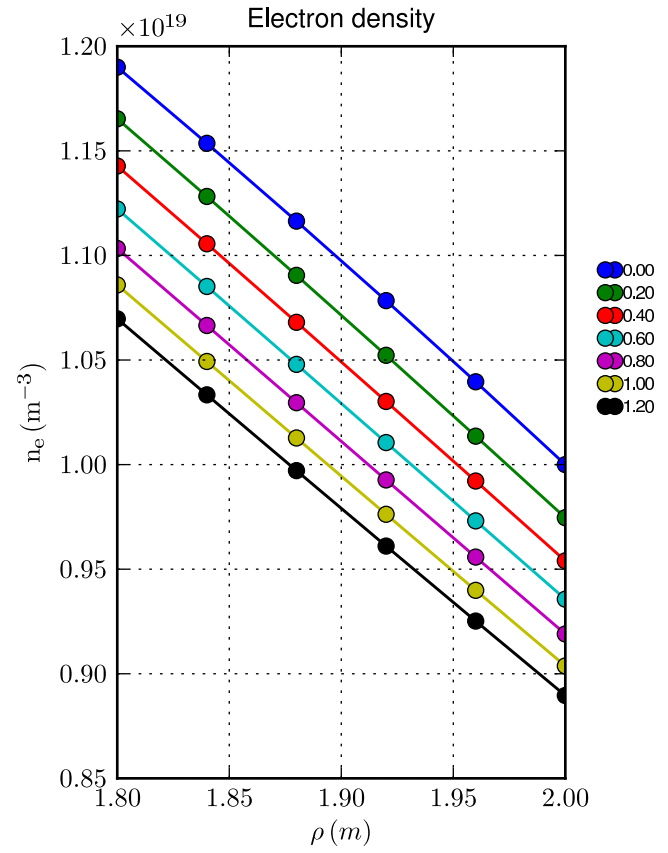
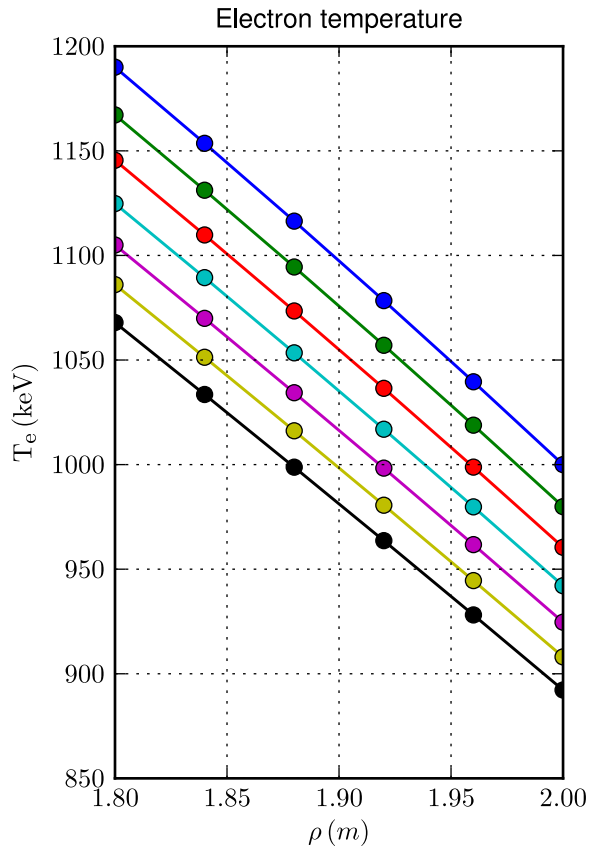


Profiles

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Spatial zoom over edge

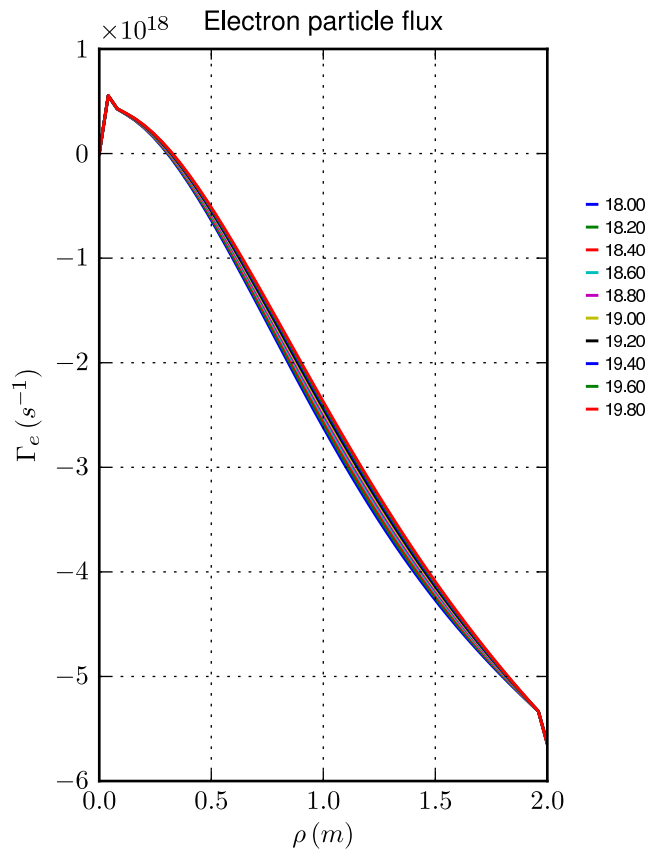
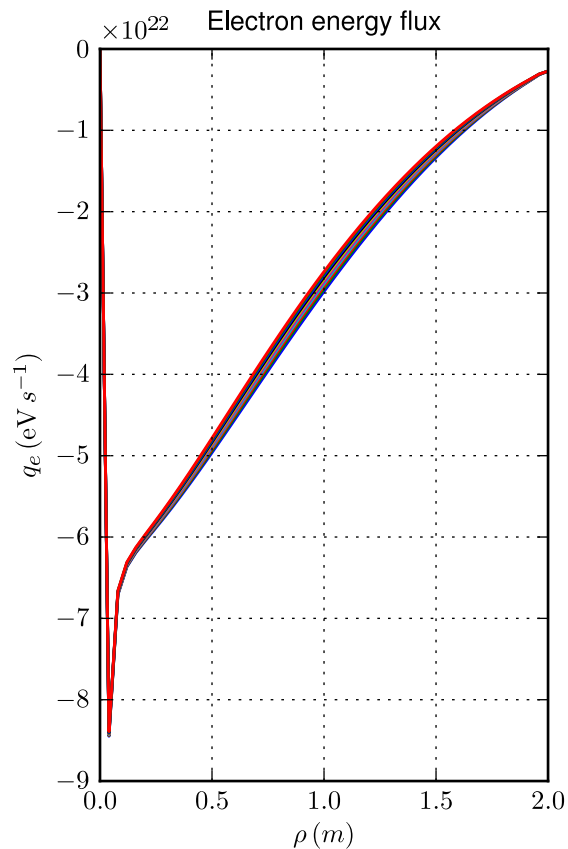
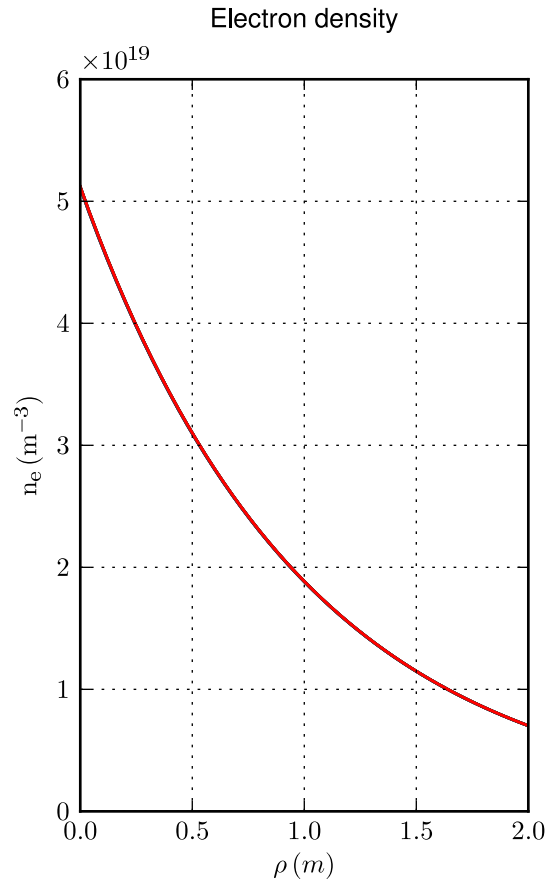
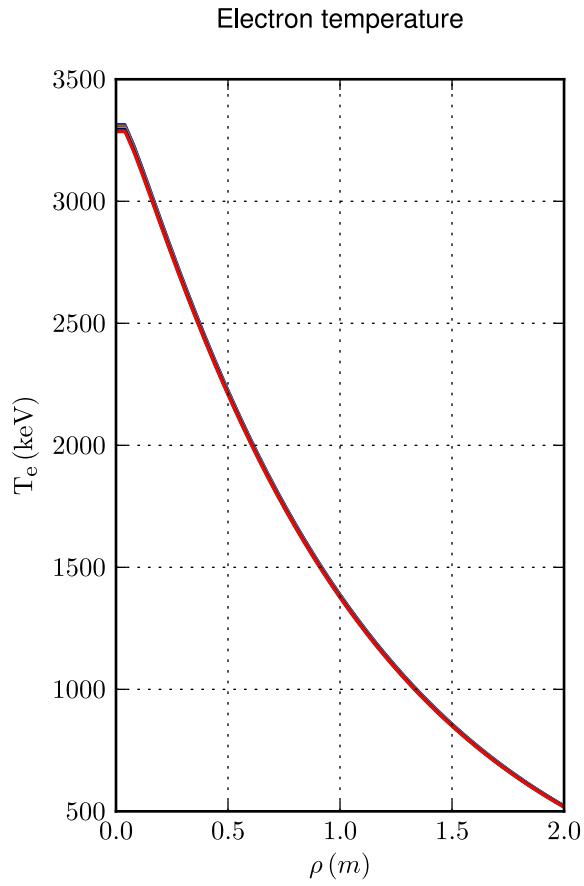
Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$



Profiles

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

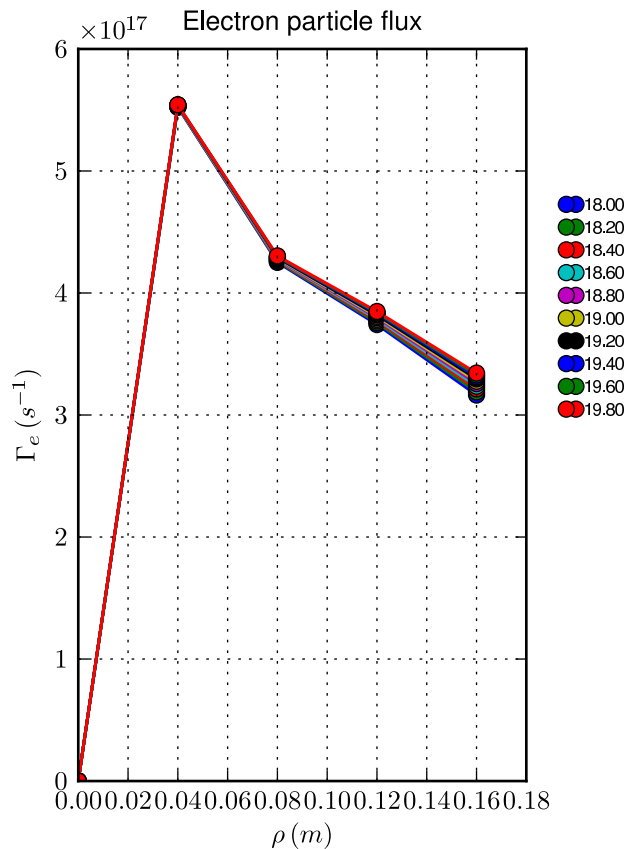
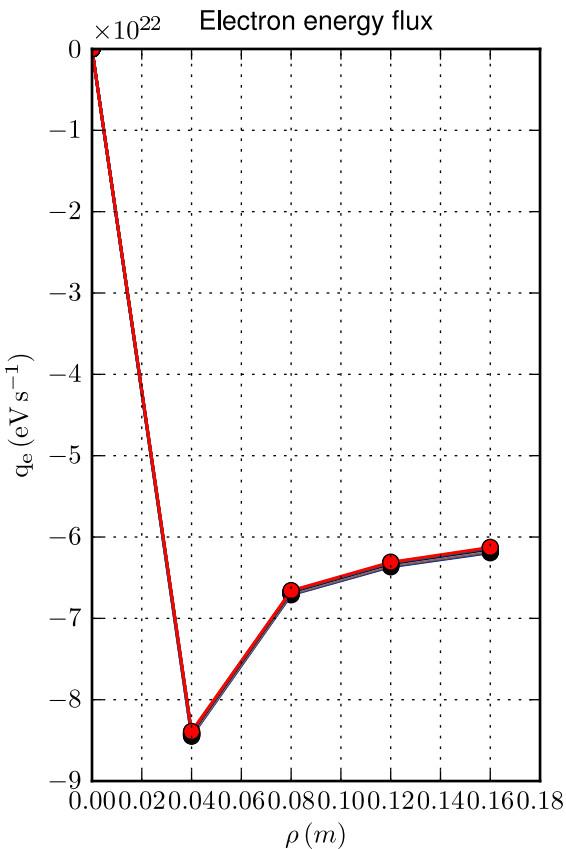
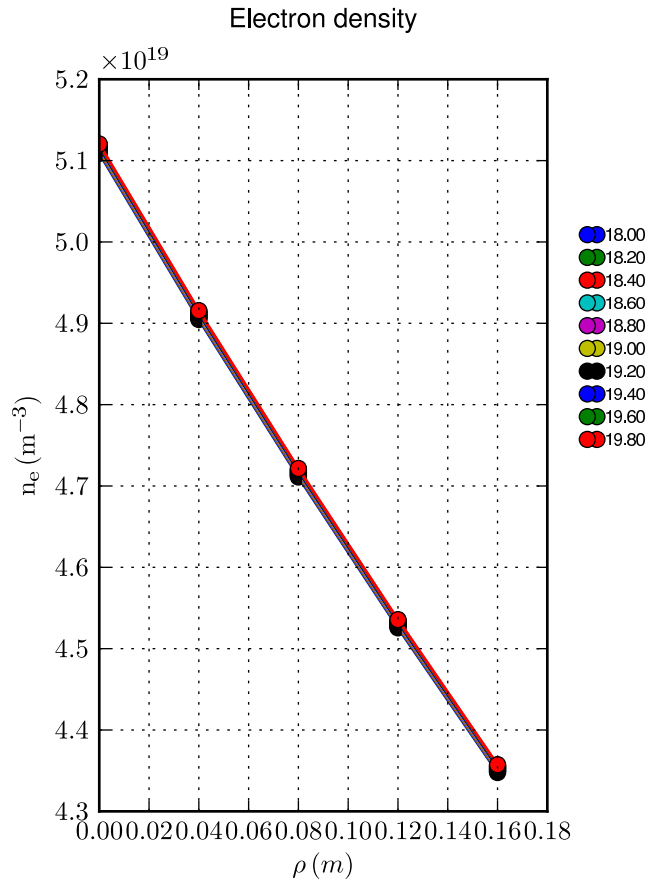
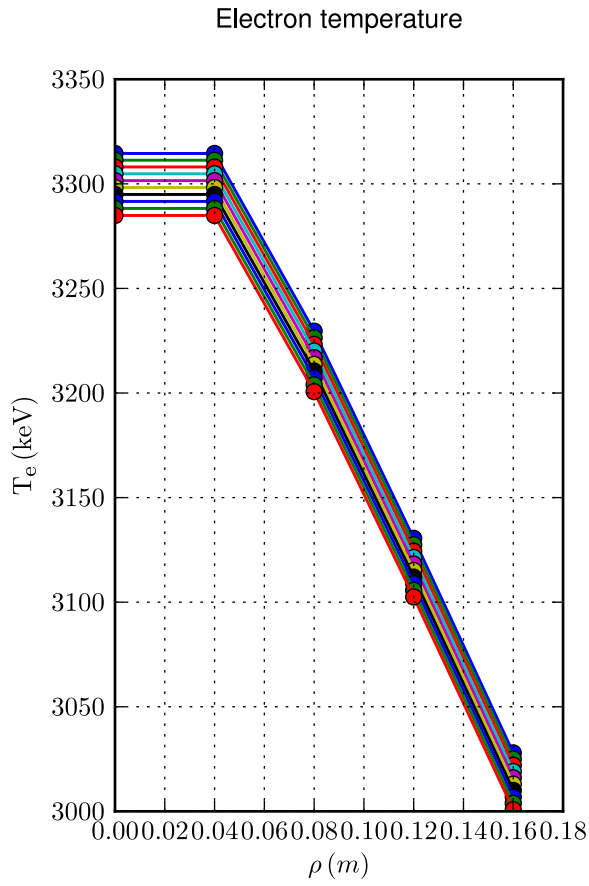
Time sampling: last 10 time slices



Profiles

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

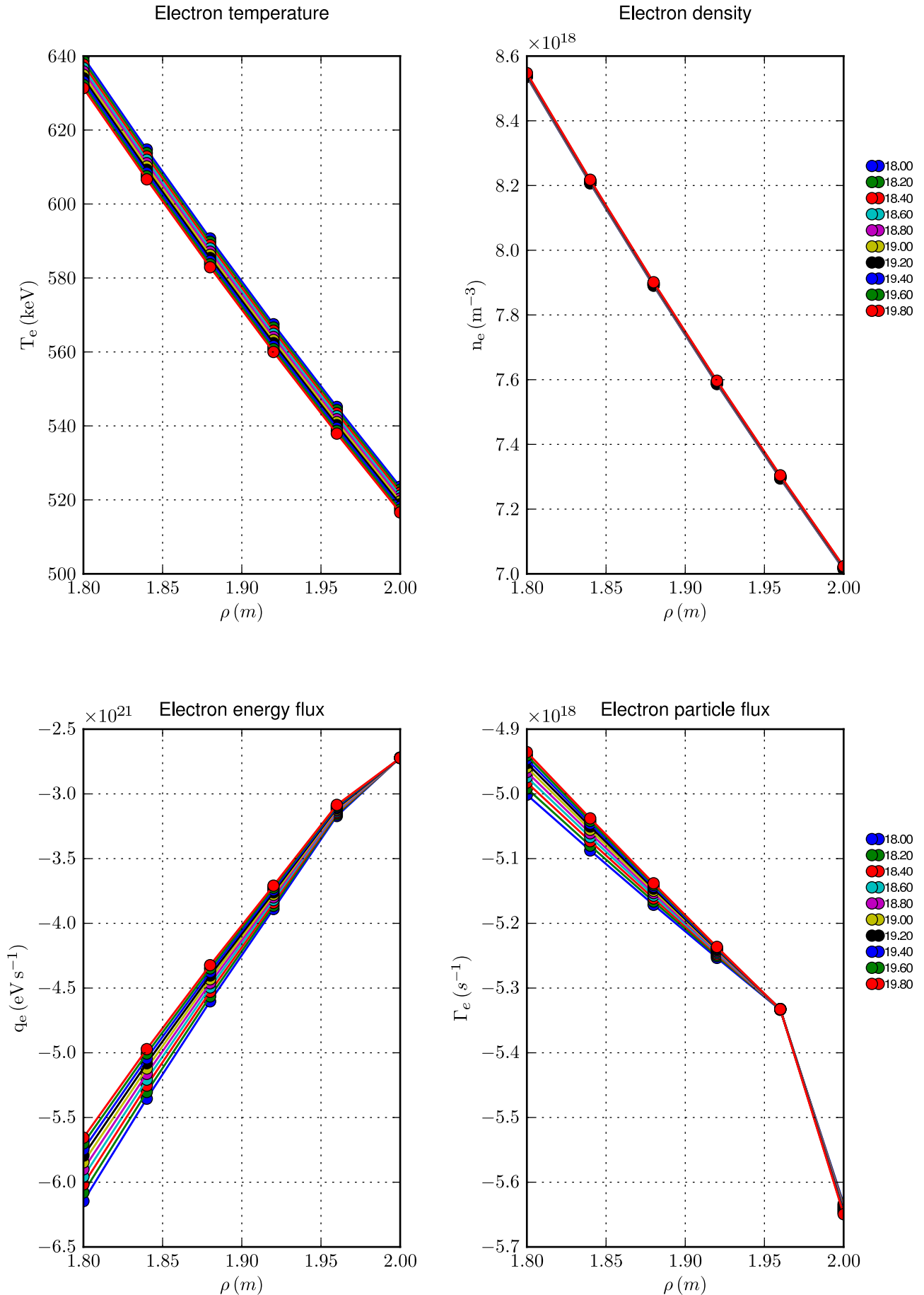
Spatial zoom over magnetic axis; time sampling: last 10 time slices



Profiles

[Case: I.1.5.h, Solver: 3, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

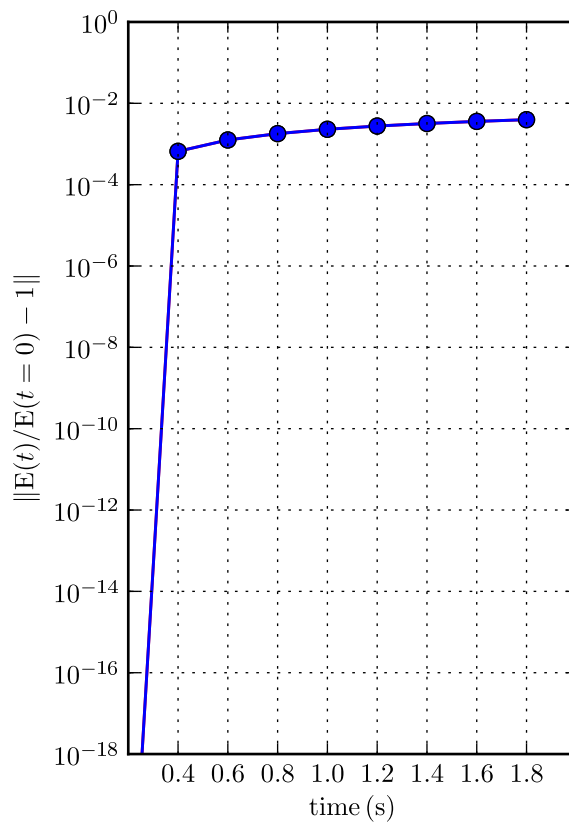
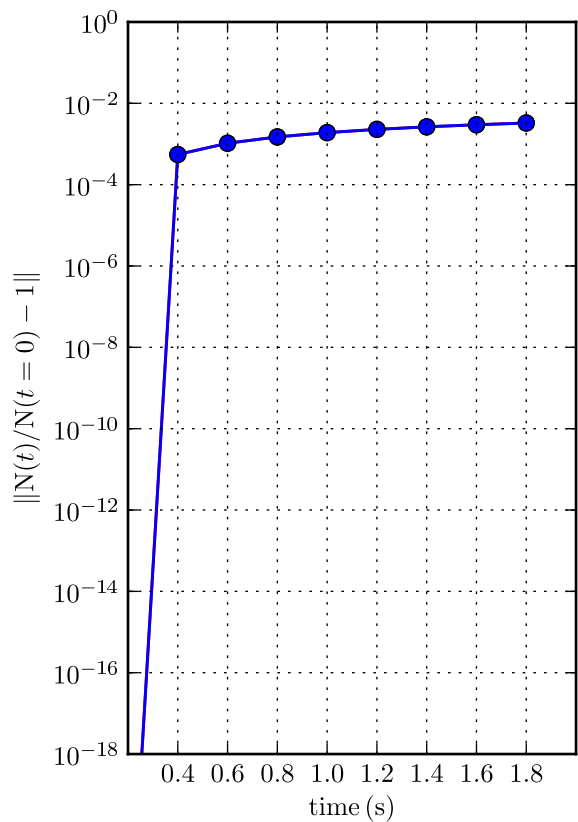
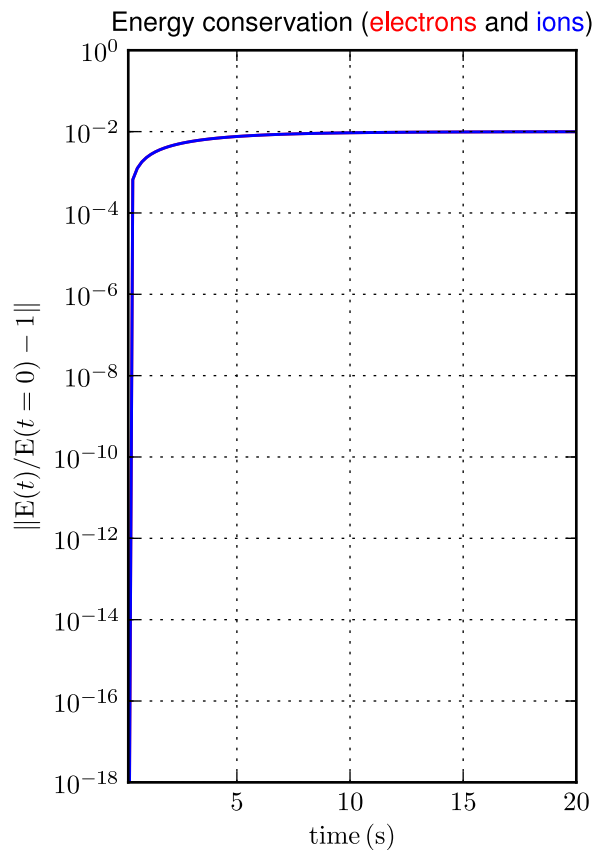
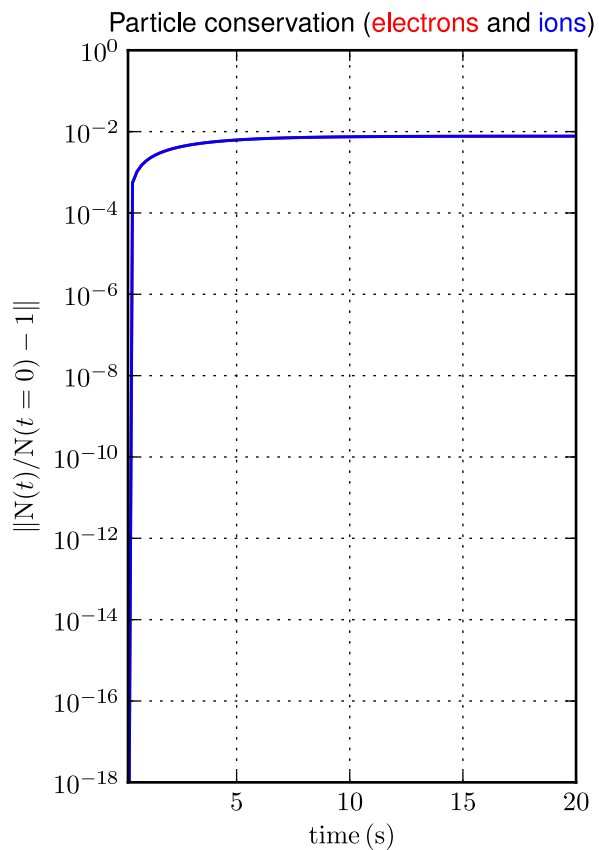
Spatial zoom over edge; time sampling: last 10 time slices



Part. & Energy conservation

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

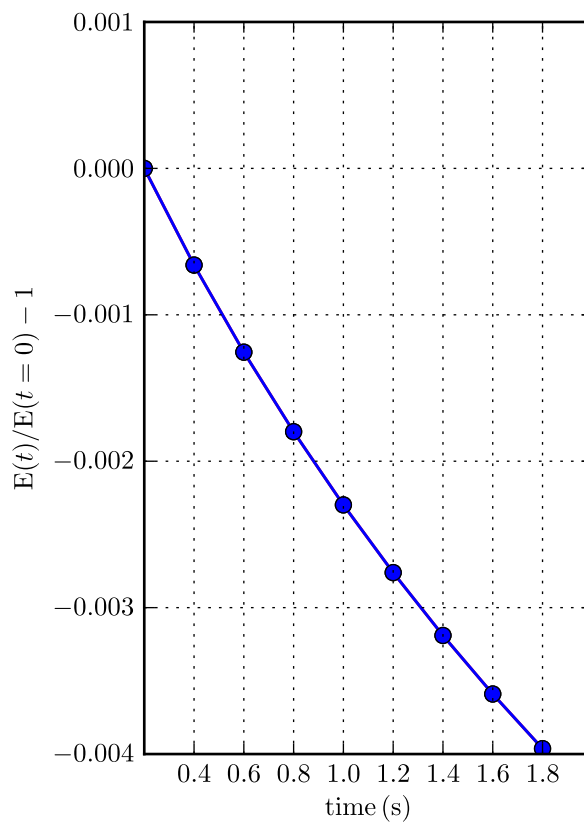
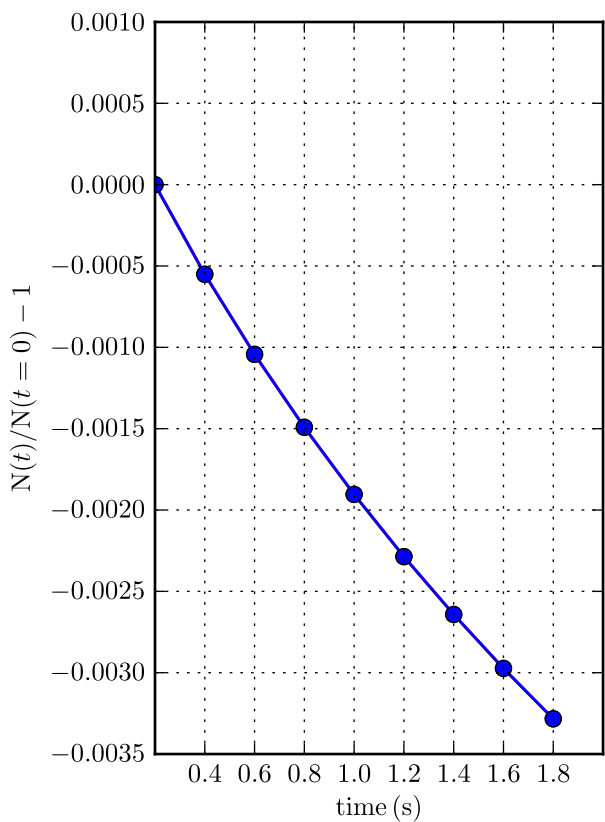
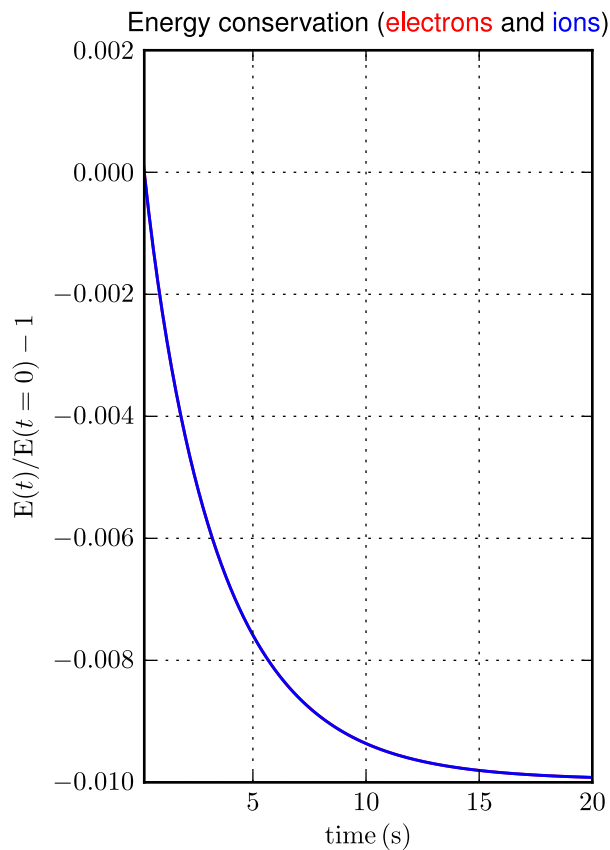
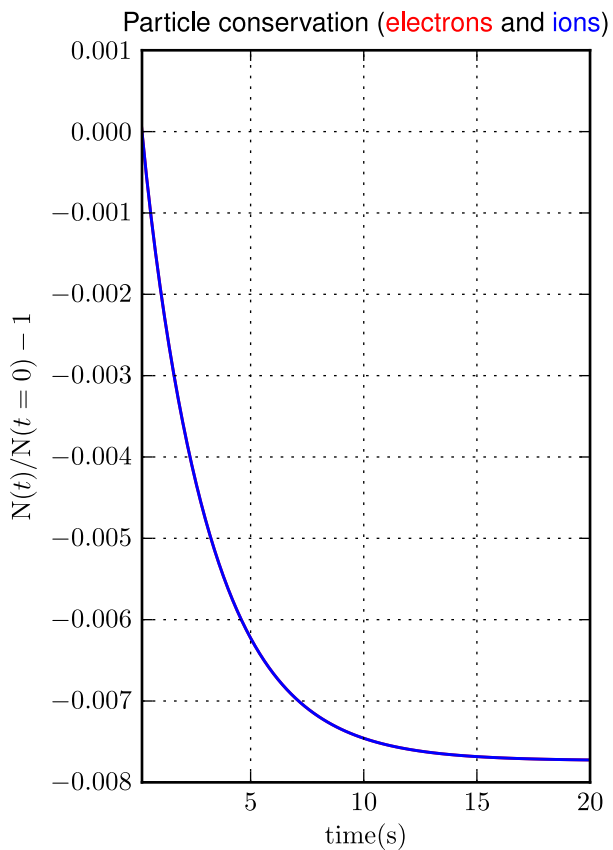
Comparison with initial solution - log scale; total time and zoom over time



Part. & Energy conservation

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

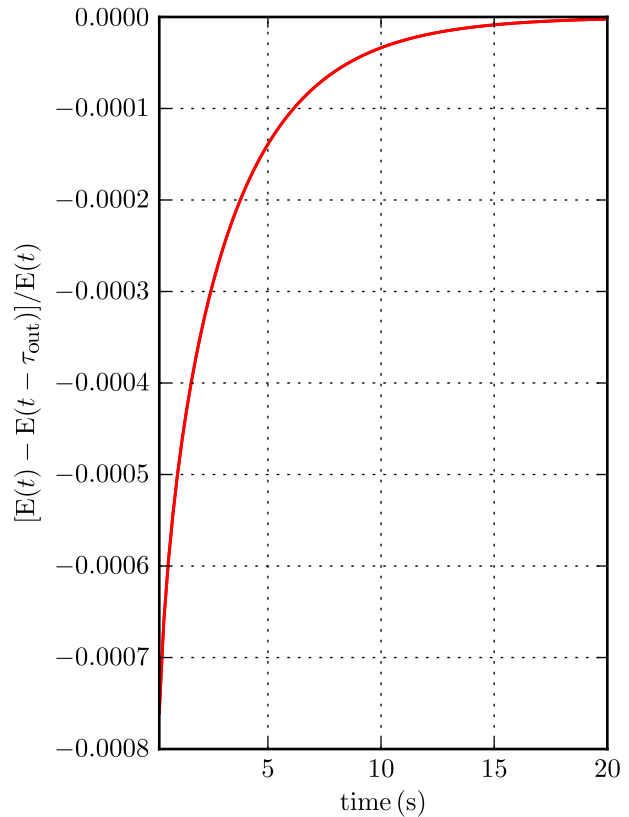
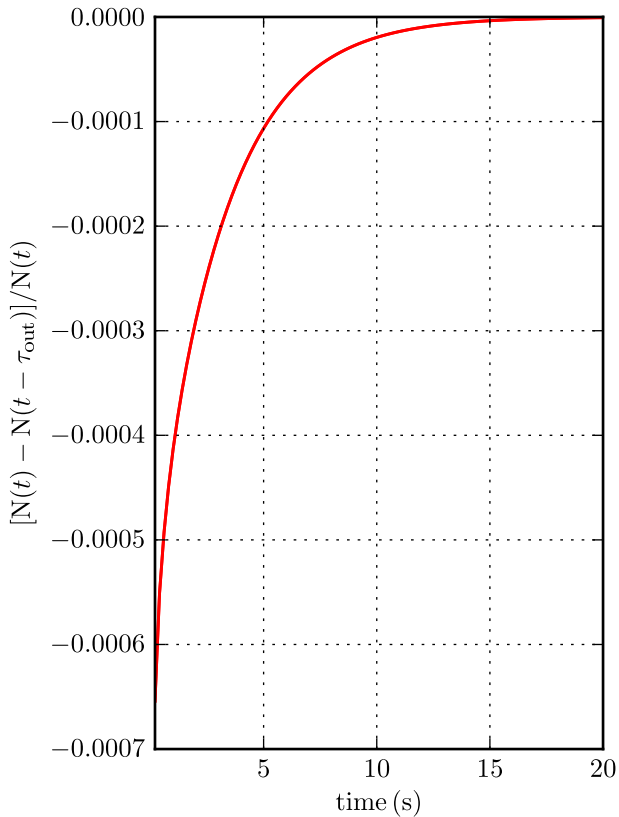
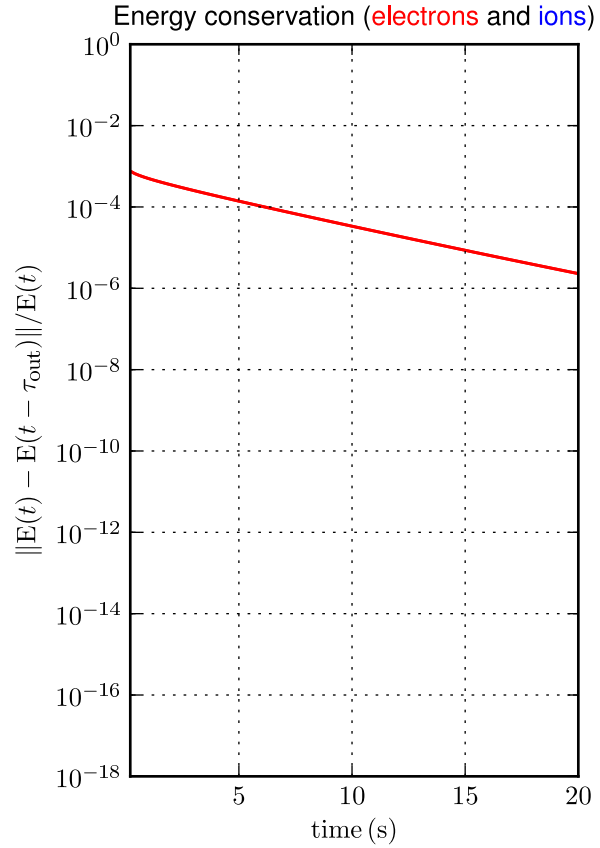
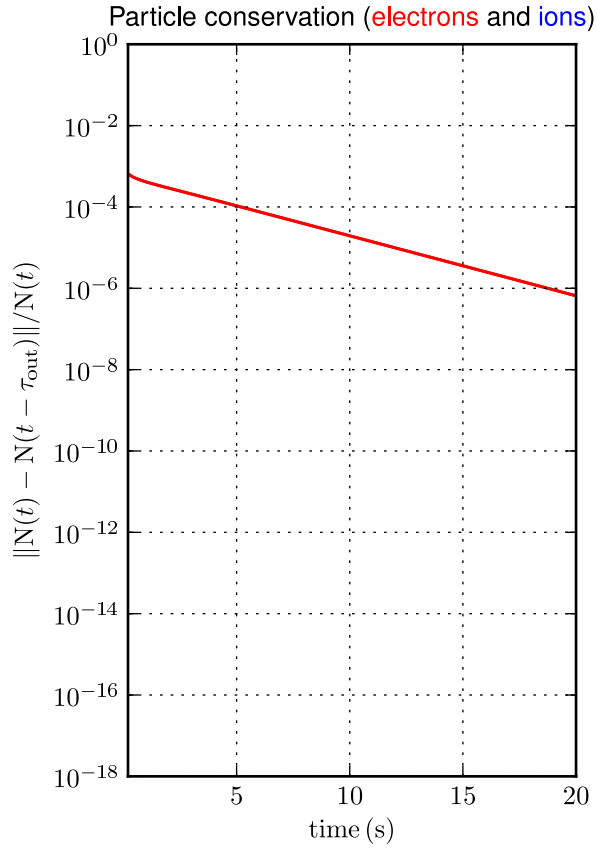
Comparison with initial solution - linear scale; total time and zoom over time



Part. & Energy conservation

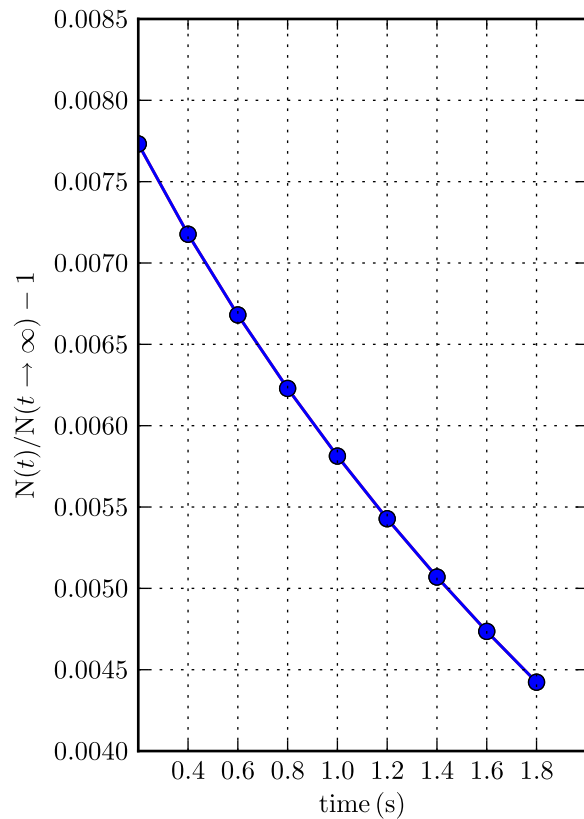
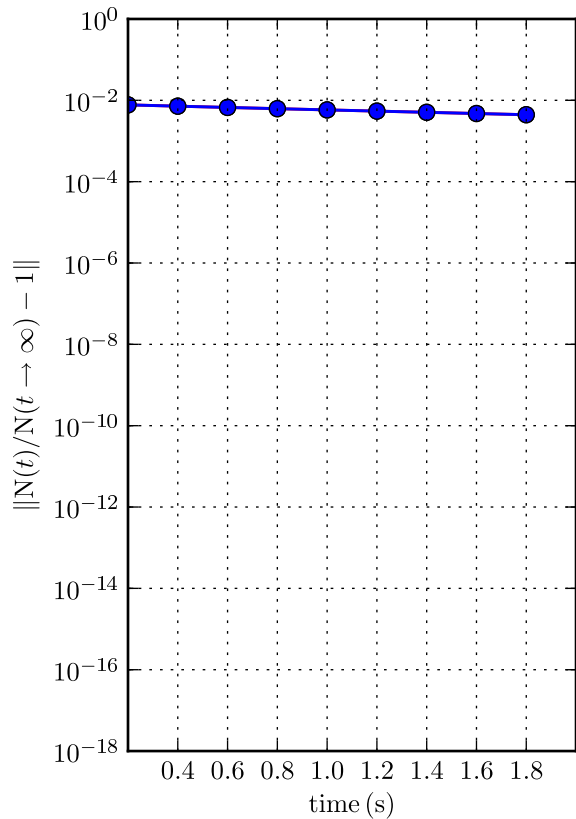
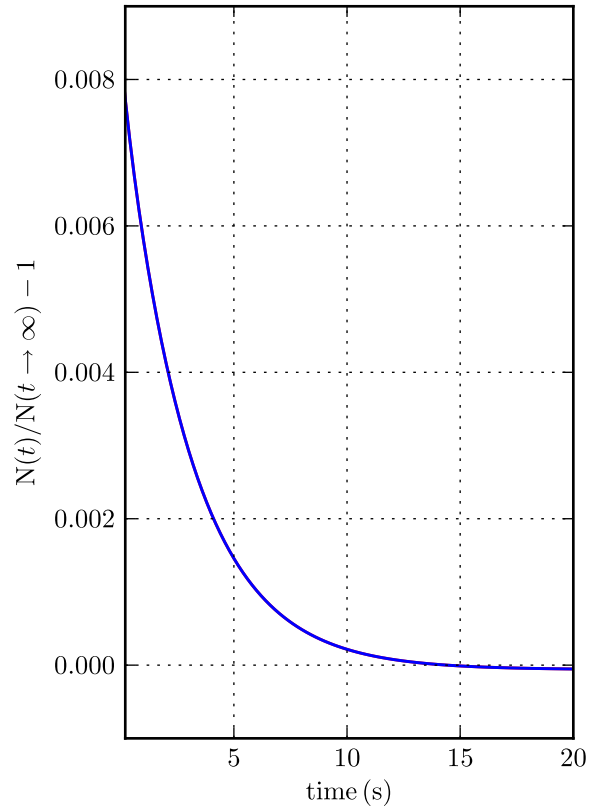
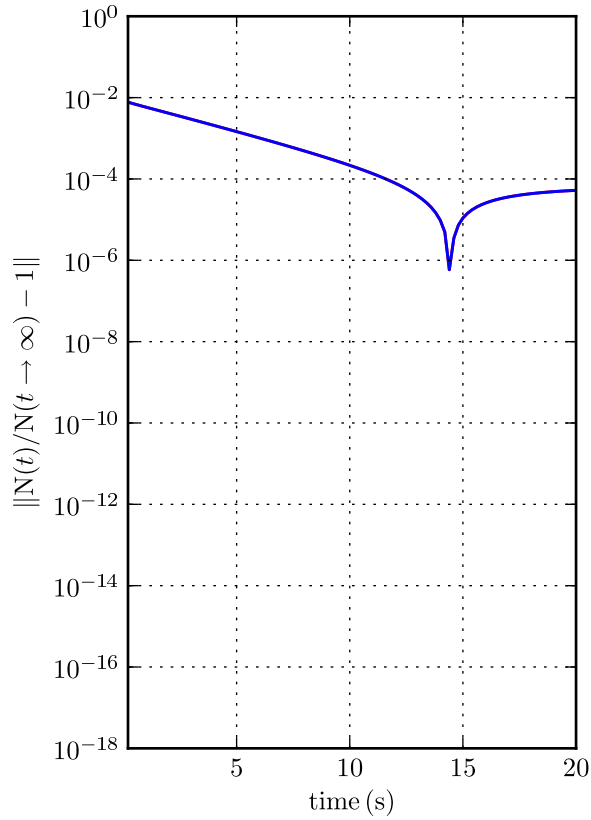
[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

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



Particle conservation

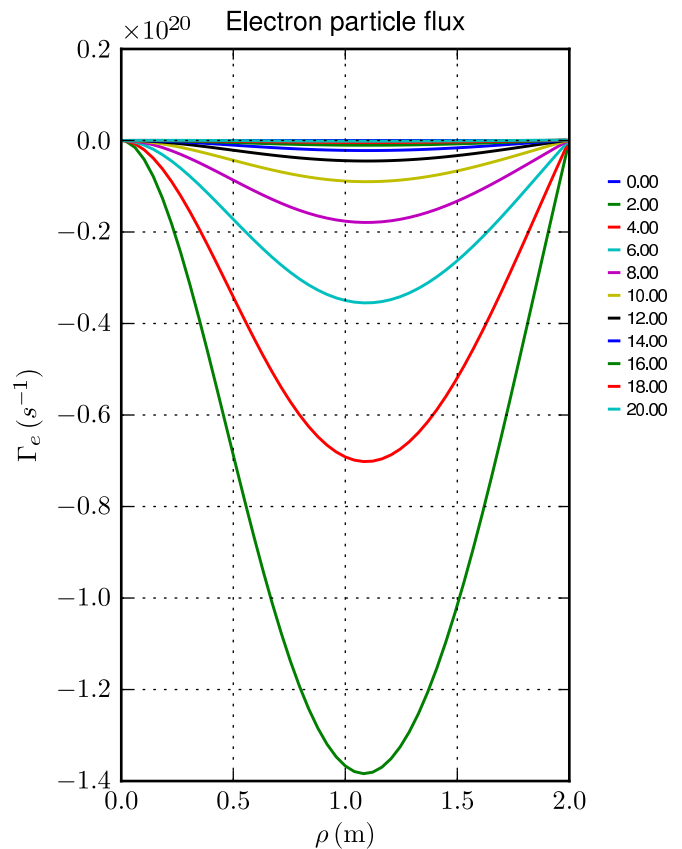
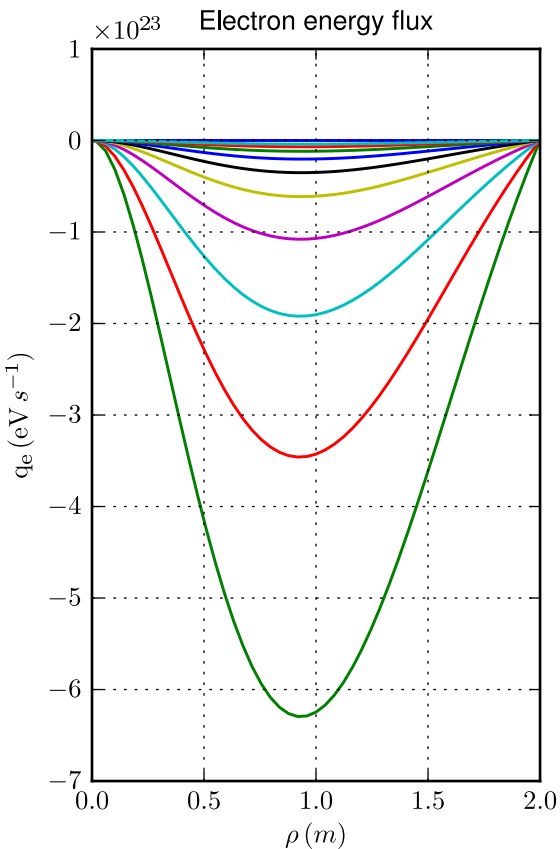
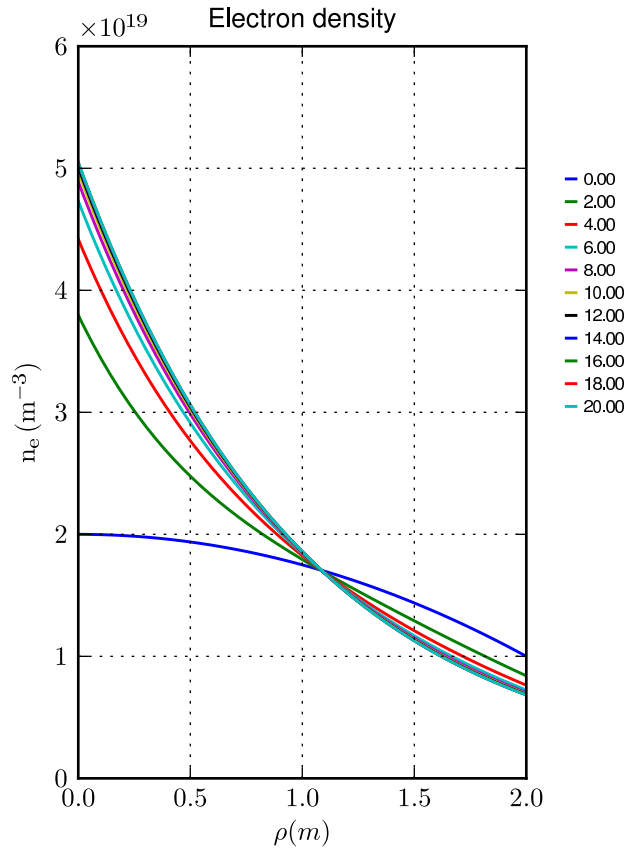
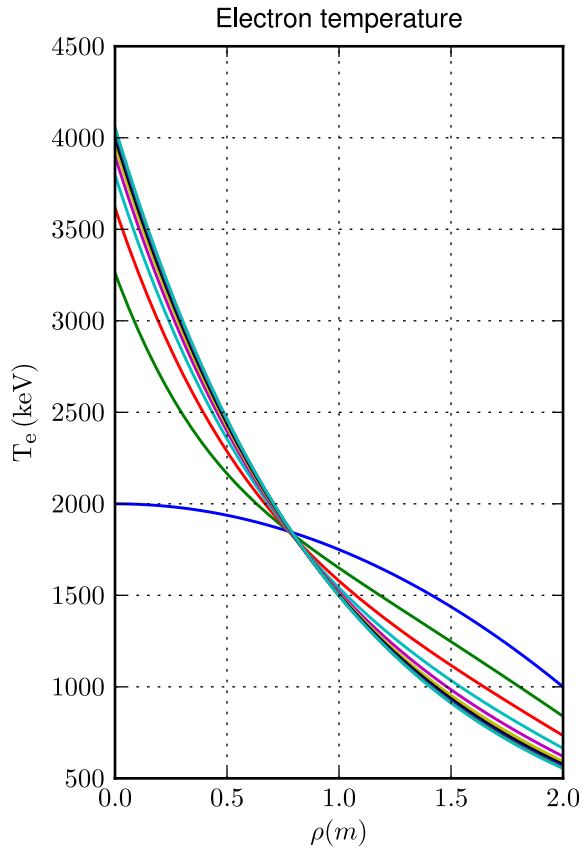
[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]
Comparison with asymptotic solution (electrons and ions); total time and zoom over time



Profiles

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Time sampling: total simulation time/10

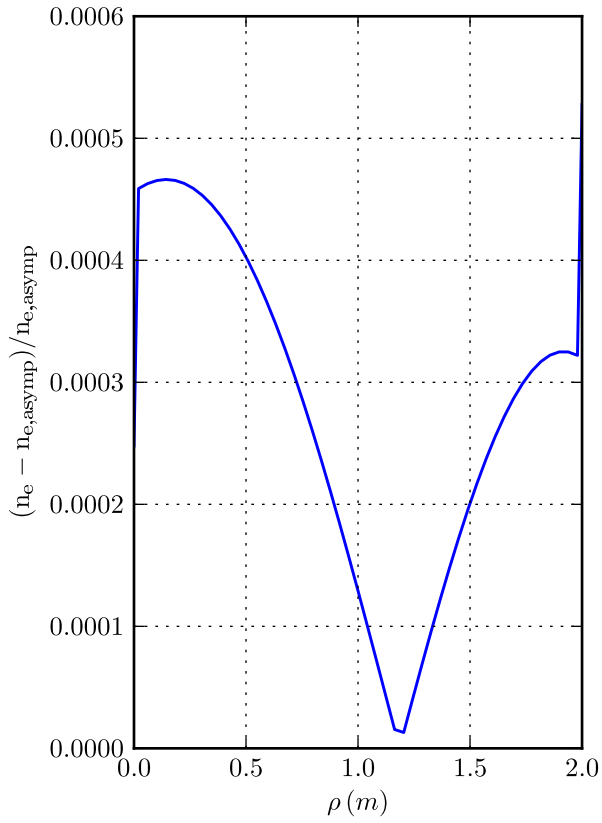


Profiles

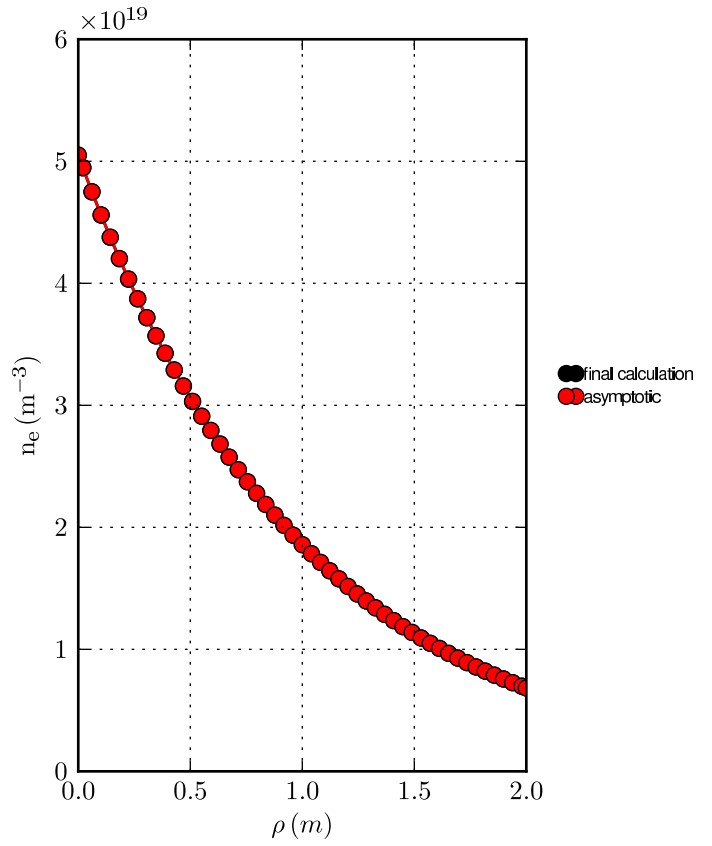
[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Comparison with asymptotic solution

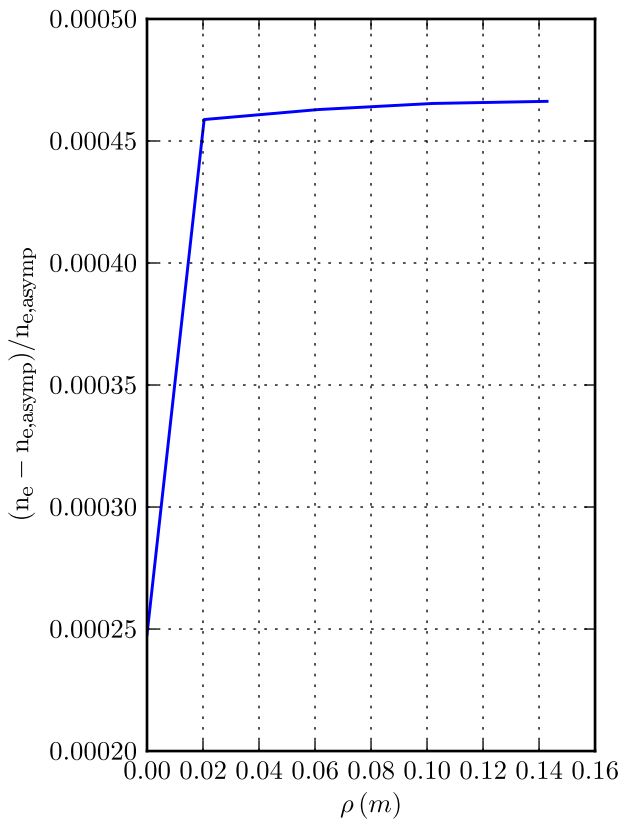
Electron density relative error



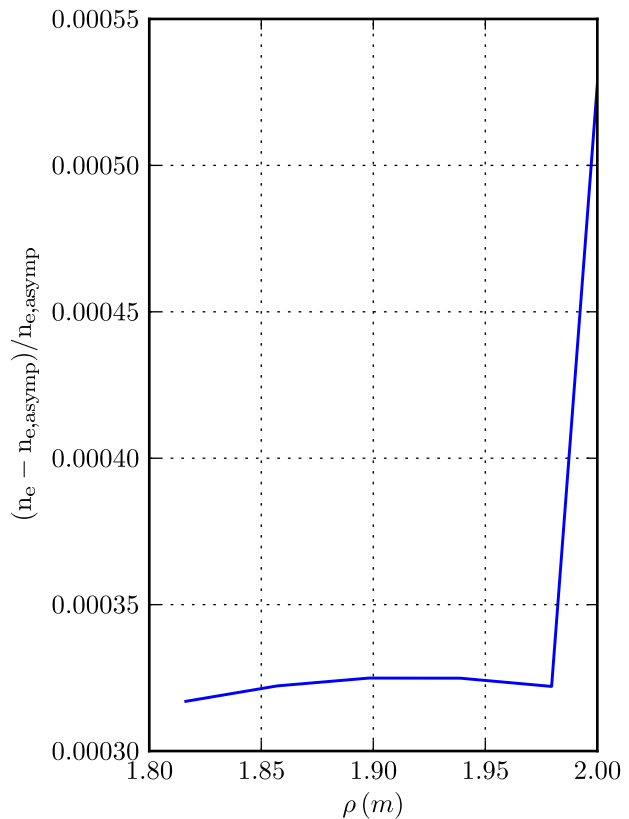
Electron density



Error: zoom over axis



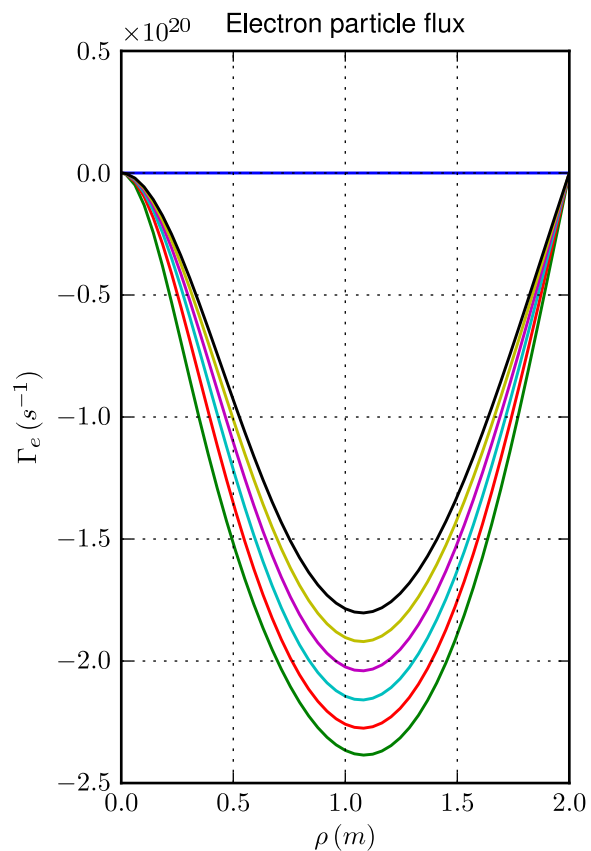
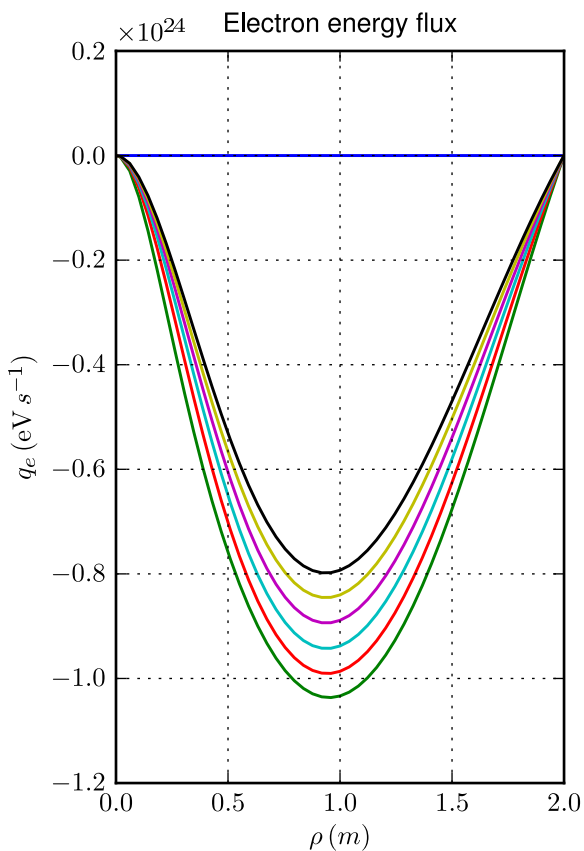
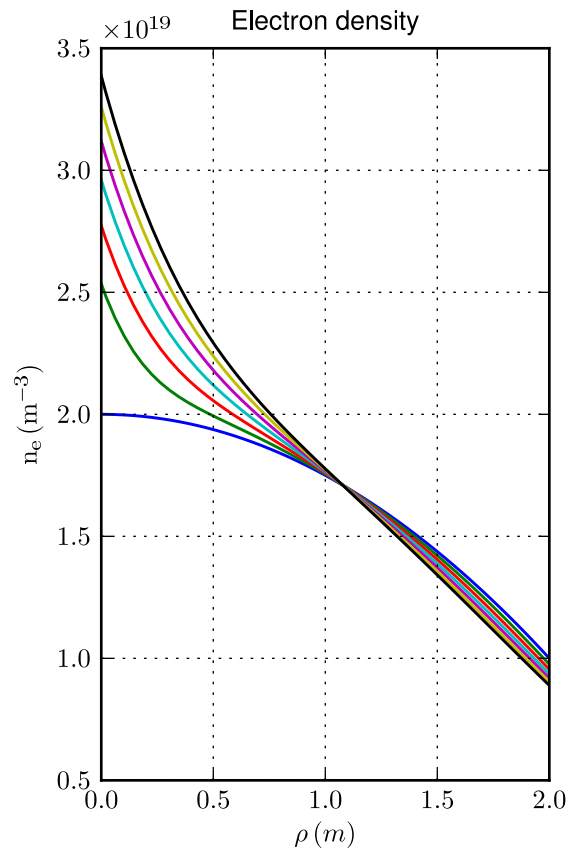
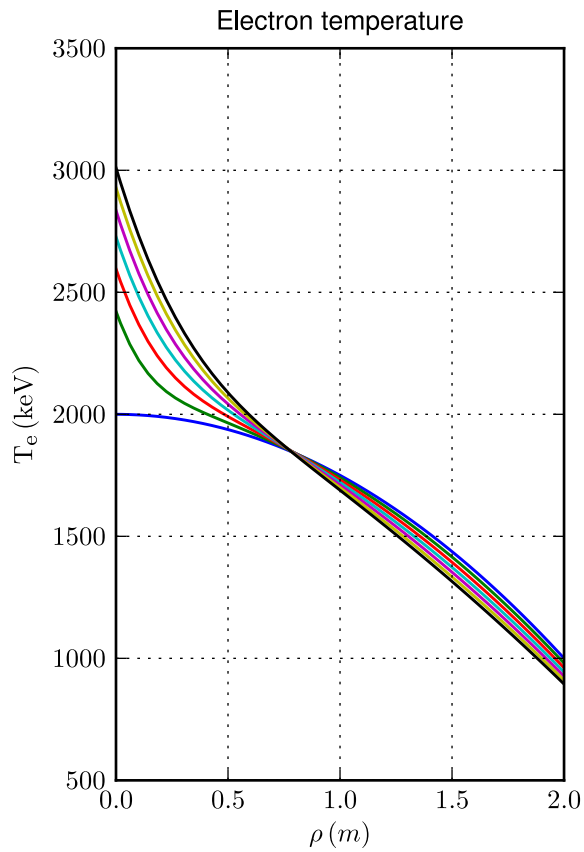
Error: zoom over edge



Profiles

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$



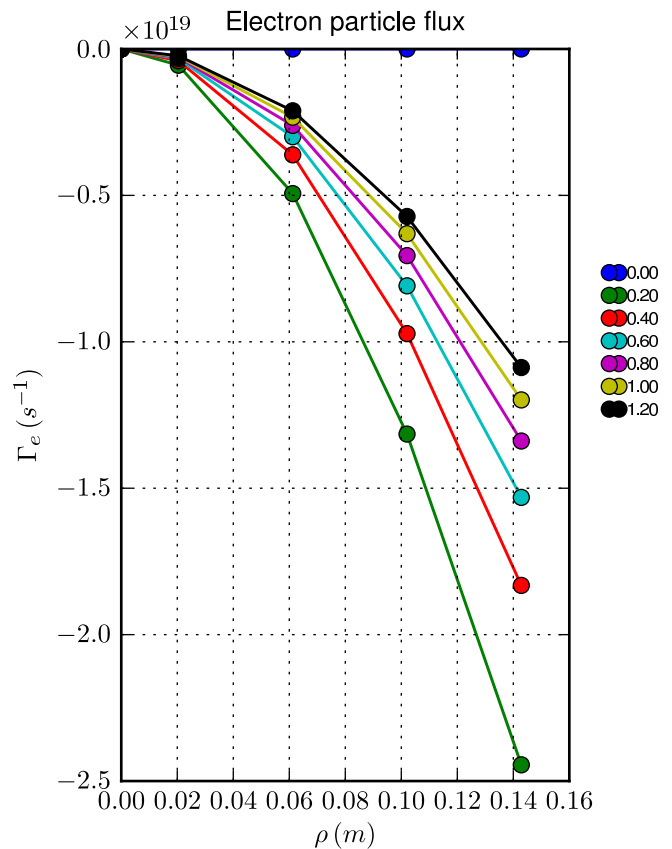
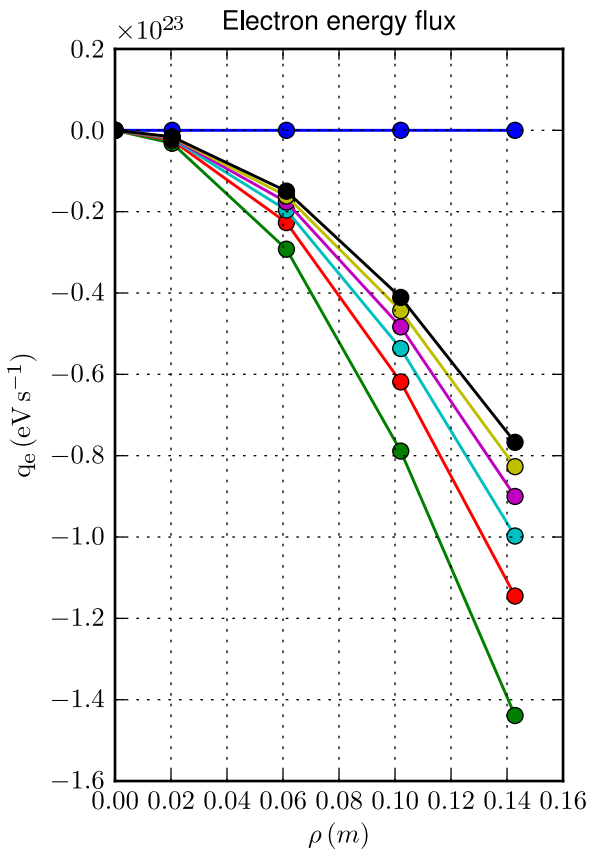
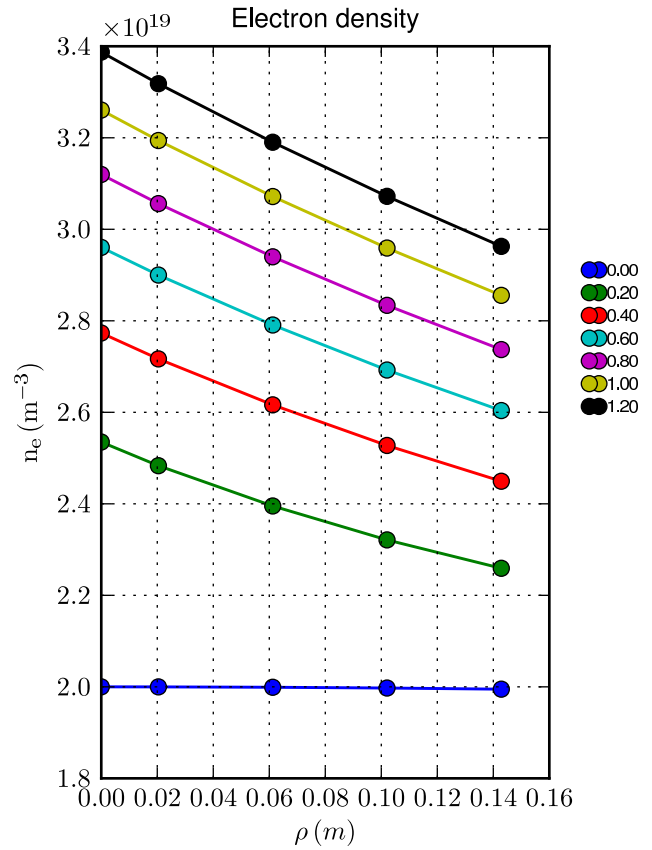
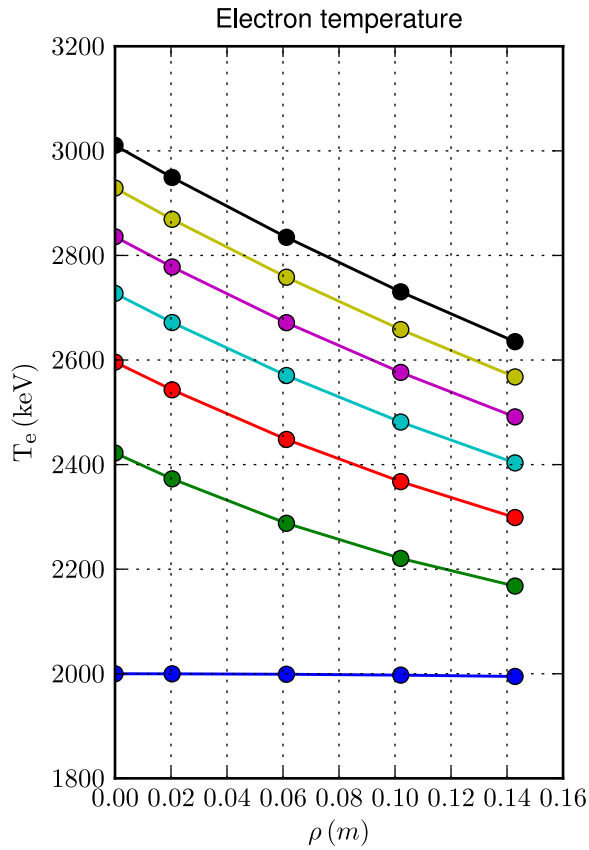
- 0.00
- 0.20
- 0.40
- 0.60
- 0.80
- 1.00
- 1.20

Profiles

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$

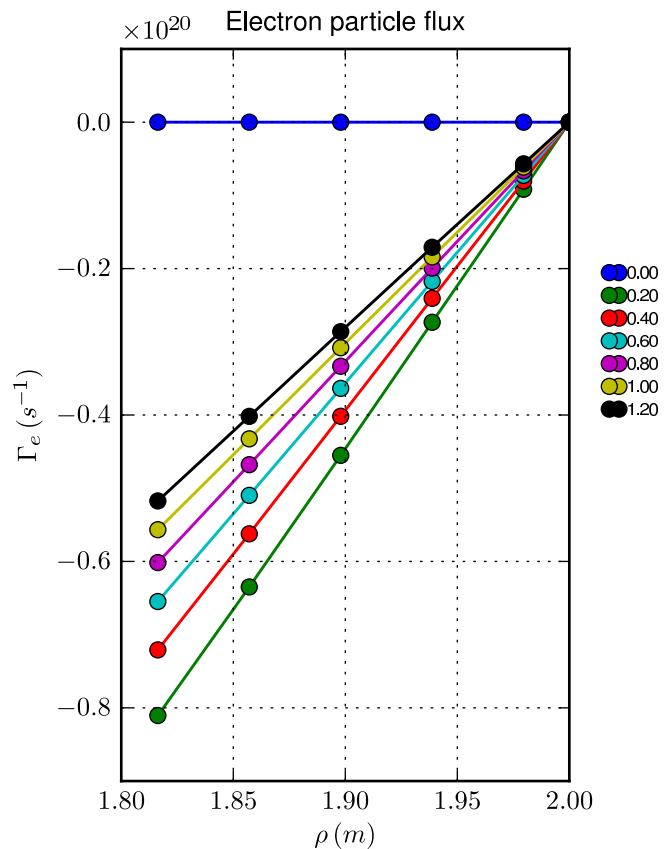
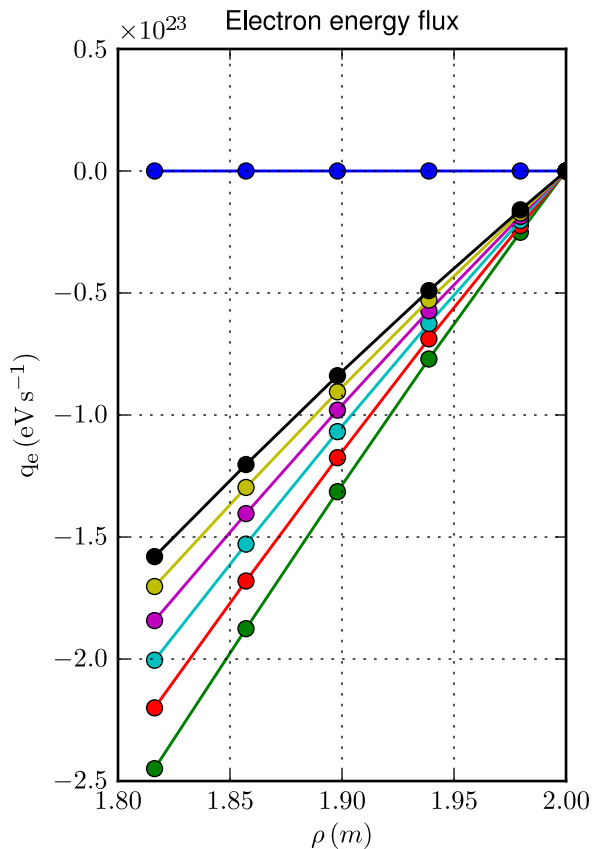
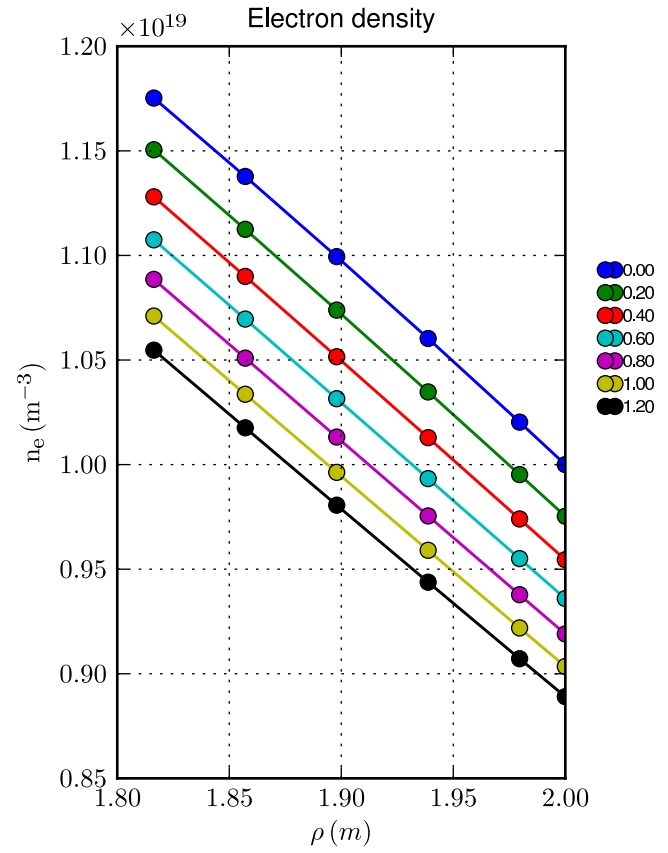
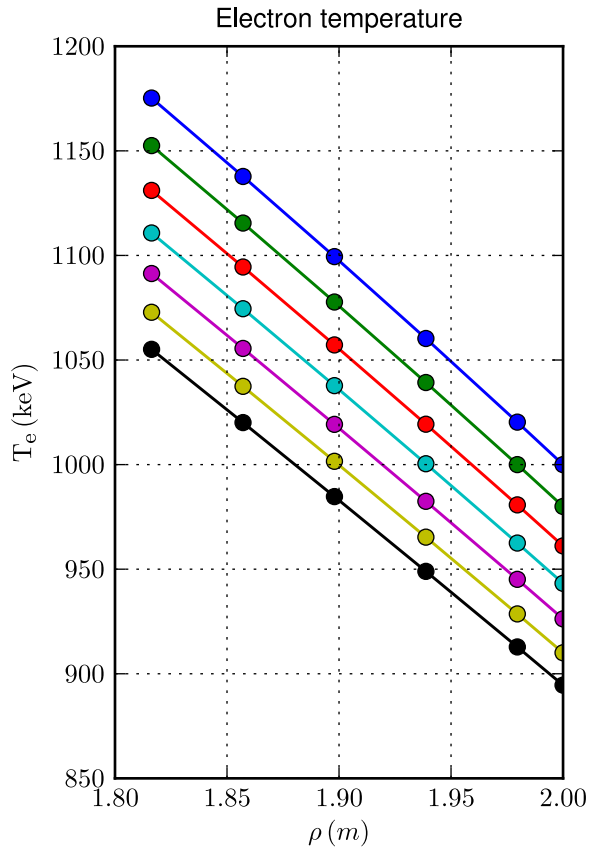


Profiles

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Spatial zoom over edge

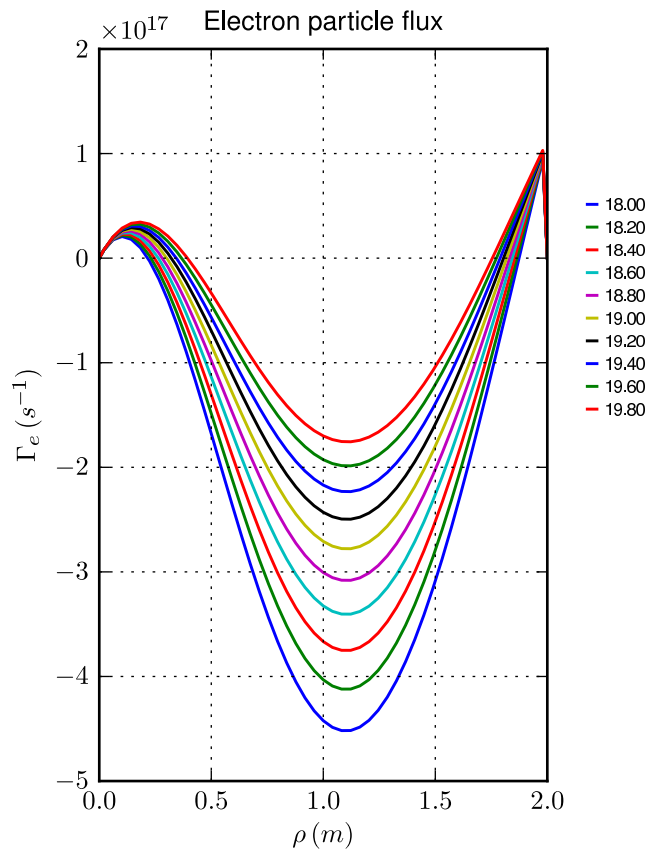
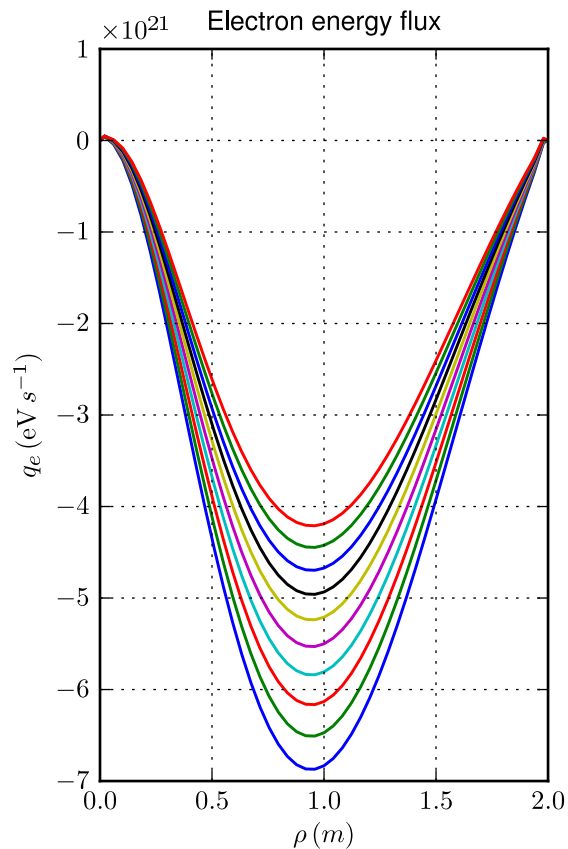
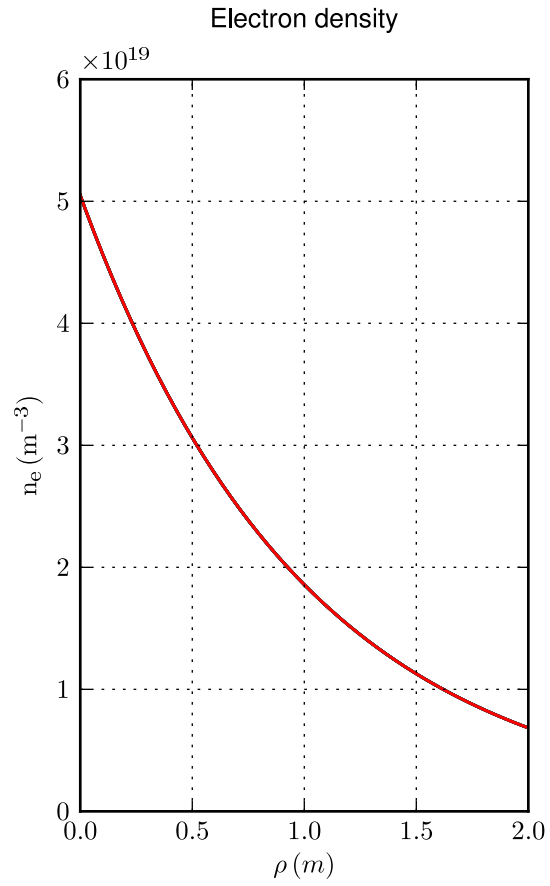
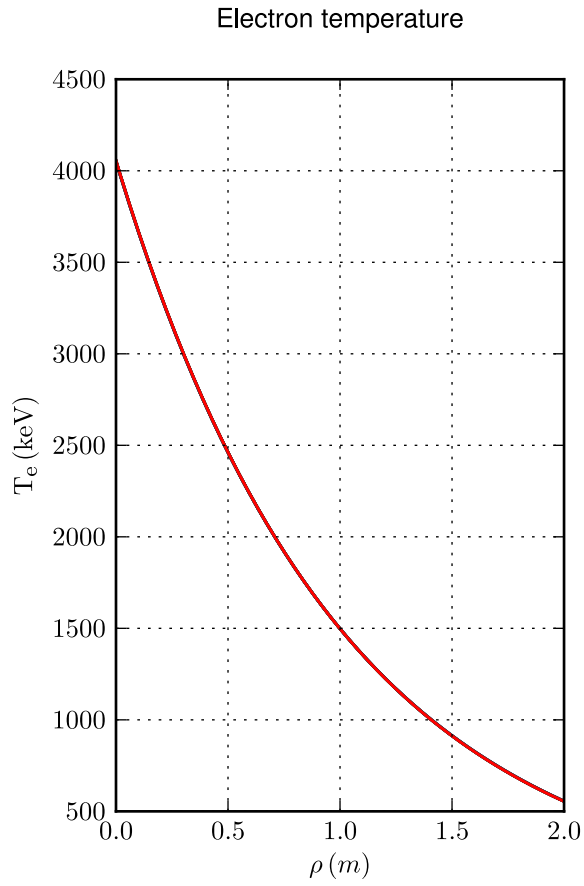
Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$



Profiles

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

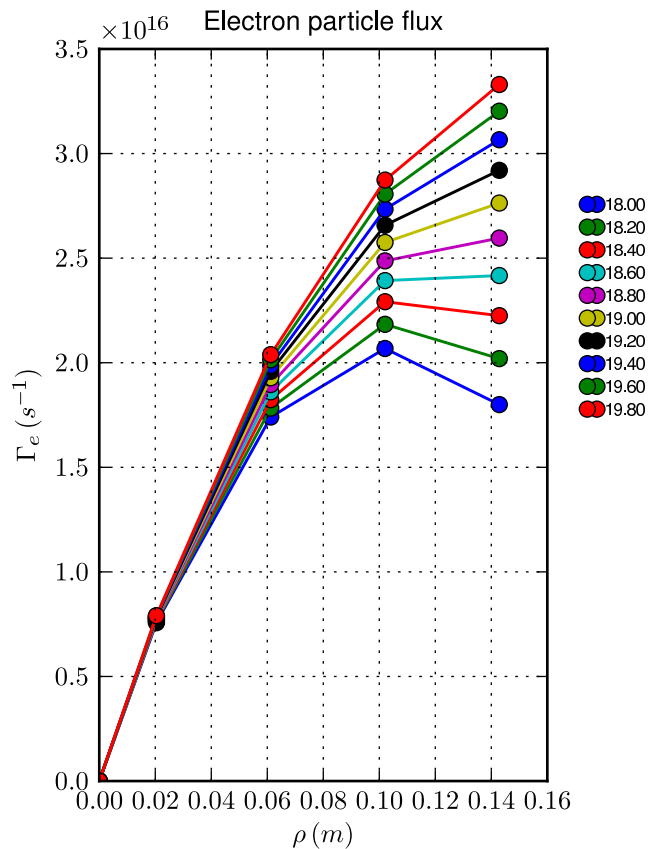
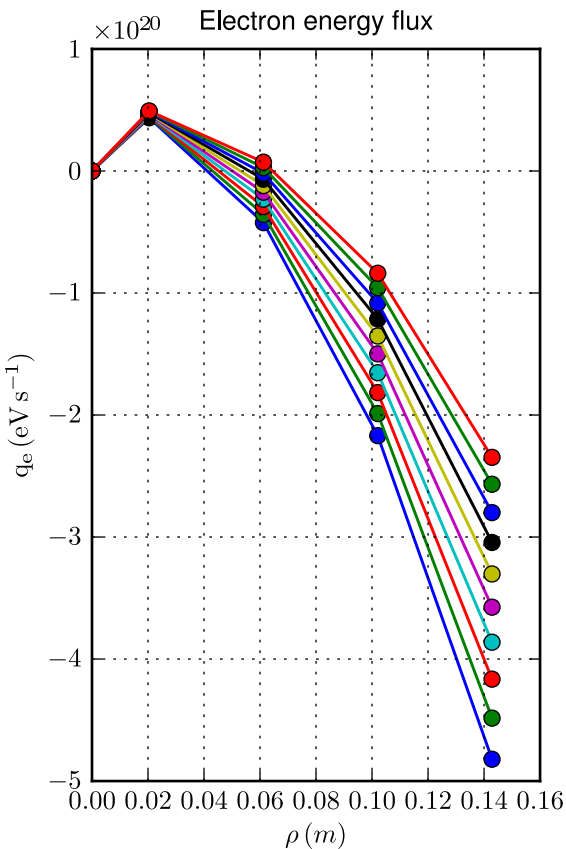
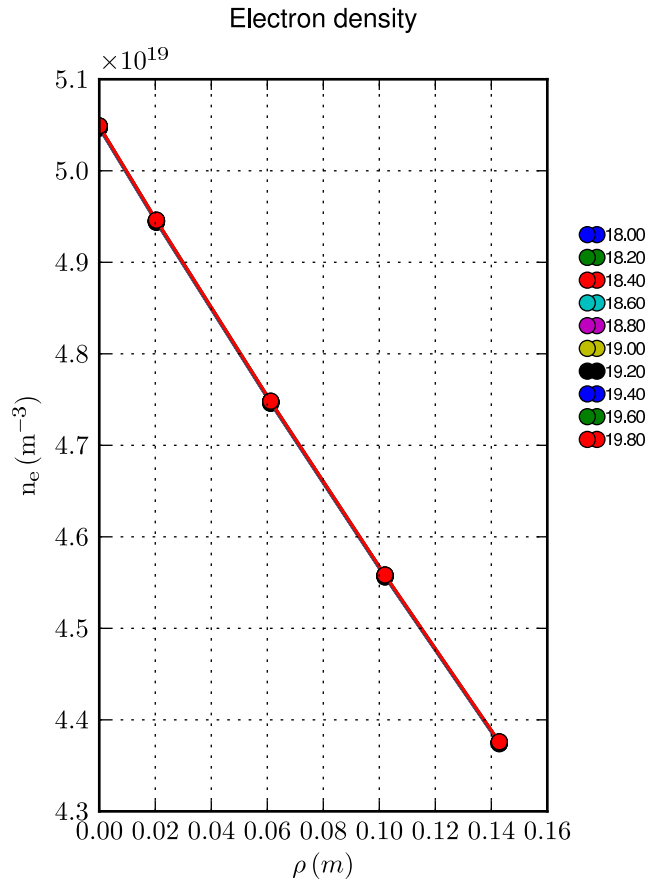
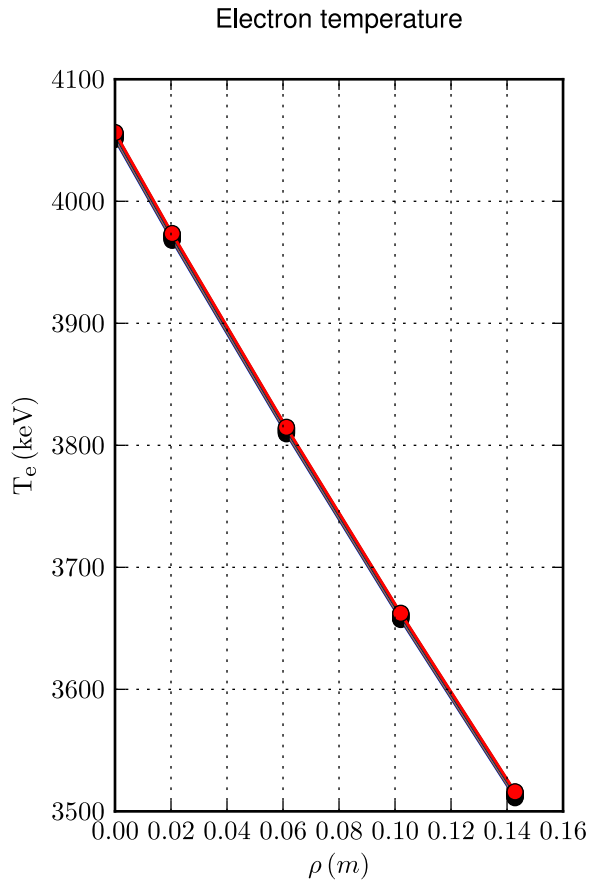
Time sampling: last 10 time slices



Profiles

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

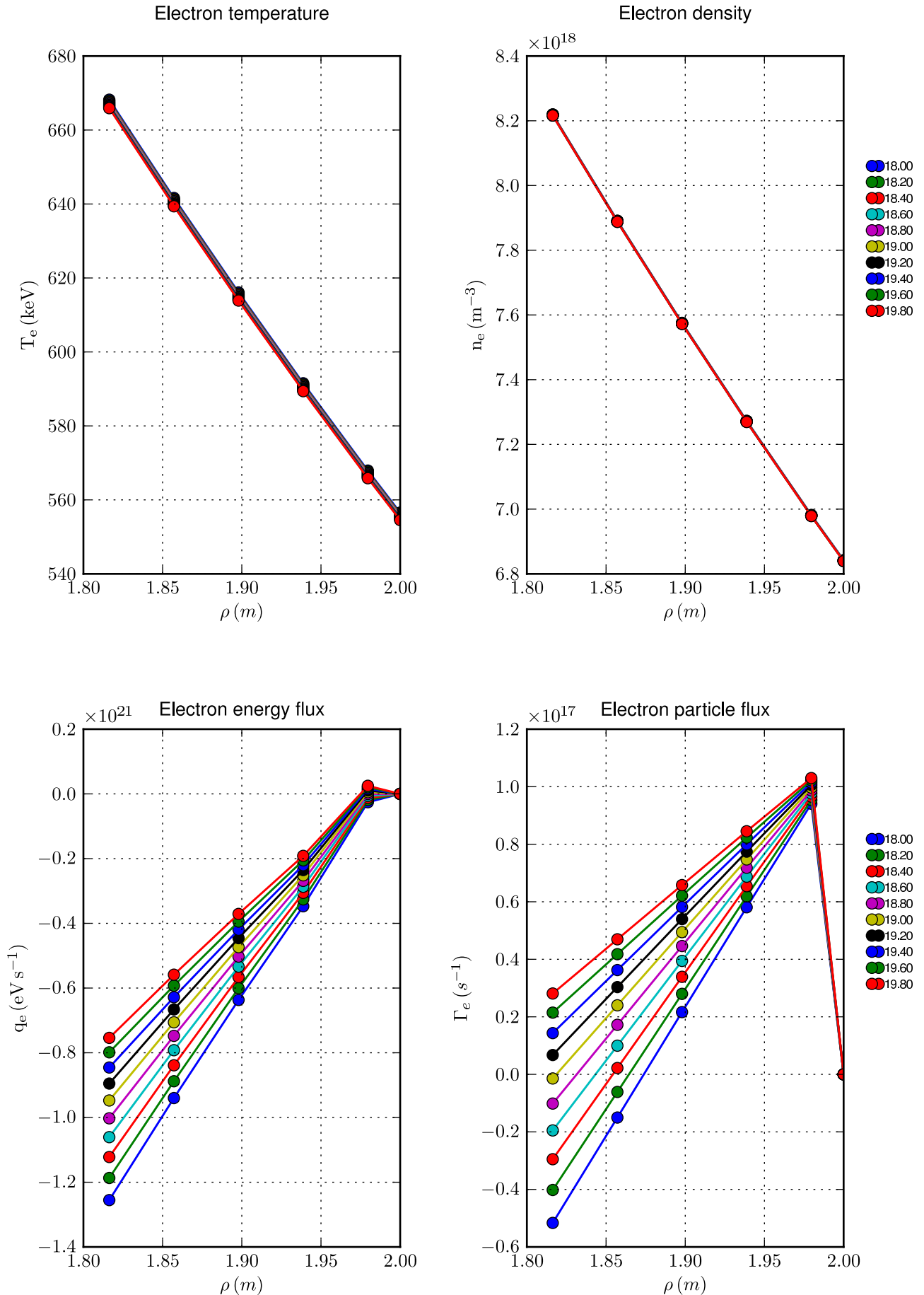
Spatial zoom over magnetic axis; time sampling: last 10 time slices



Profiles

[Case: I.1.5.h, Solver: 4, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

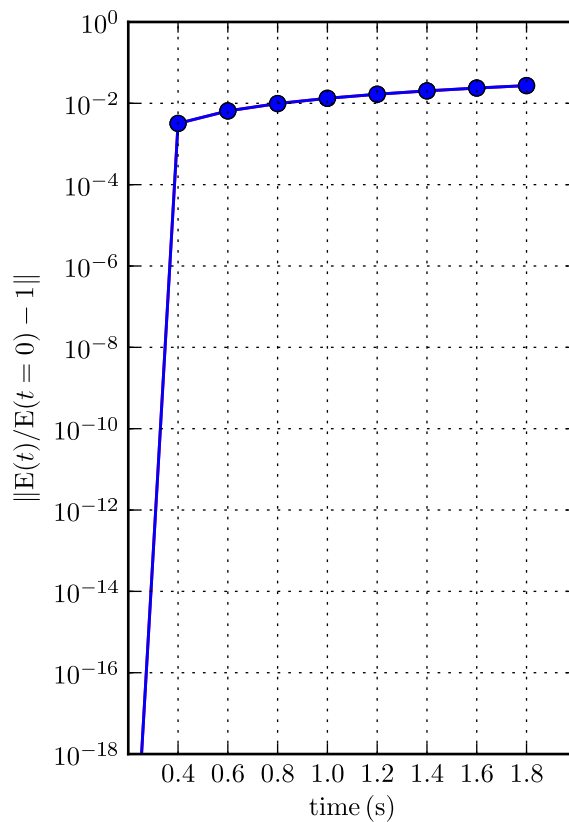
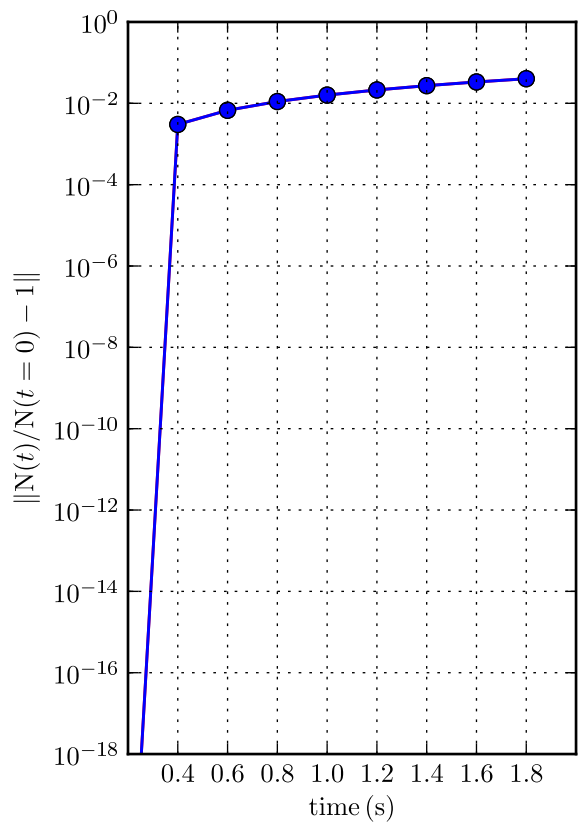
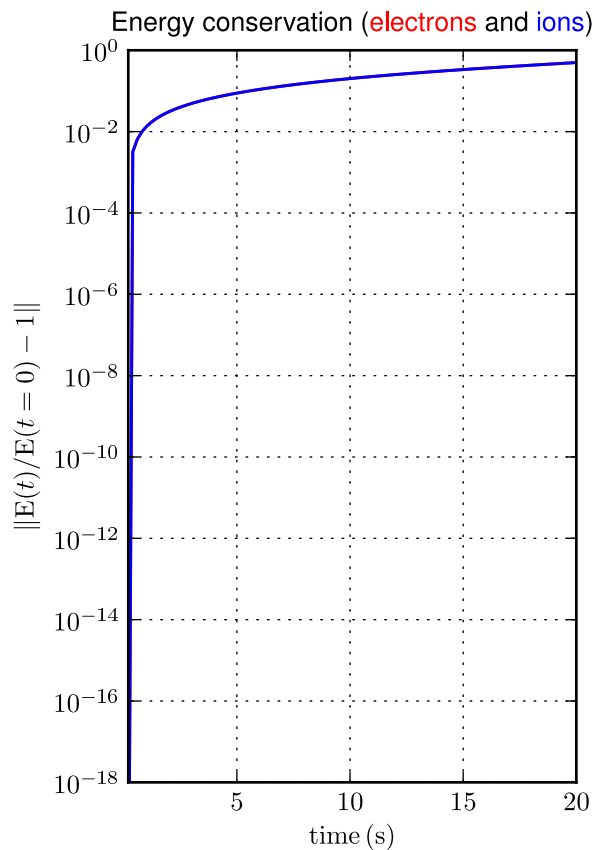
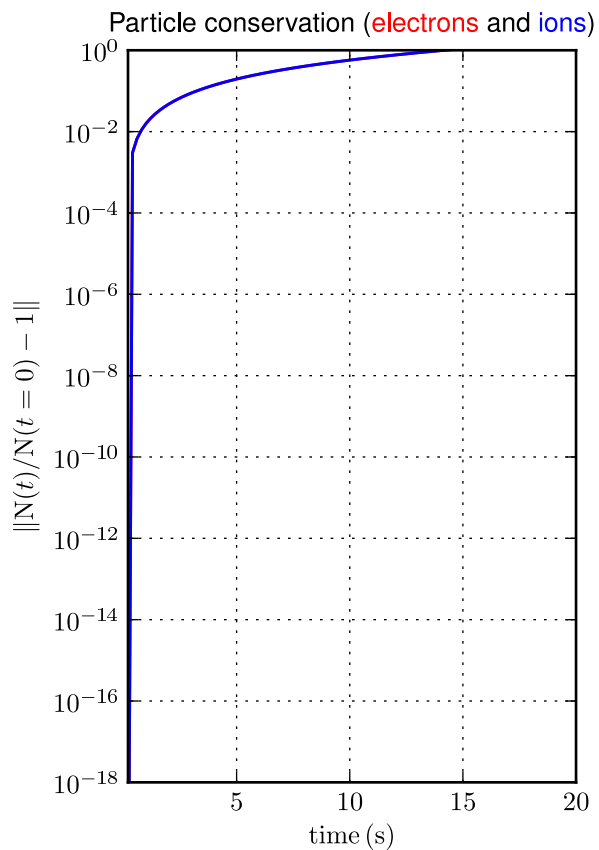
Spatial zoom over edge; time sampling: last 10 time slices



Part. & Energy conservation

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

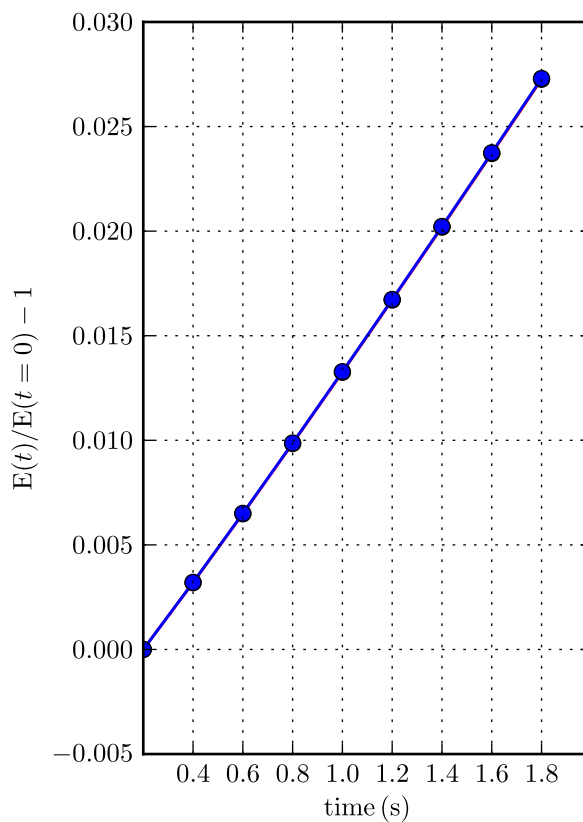
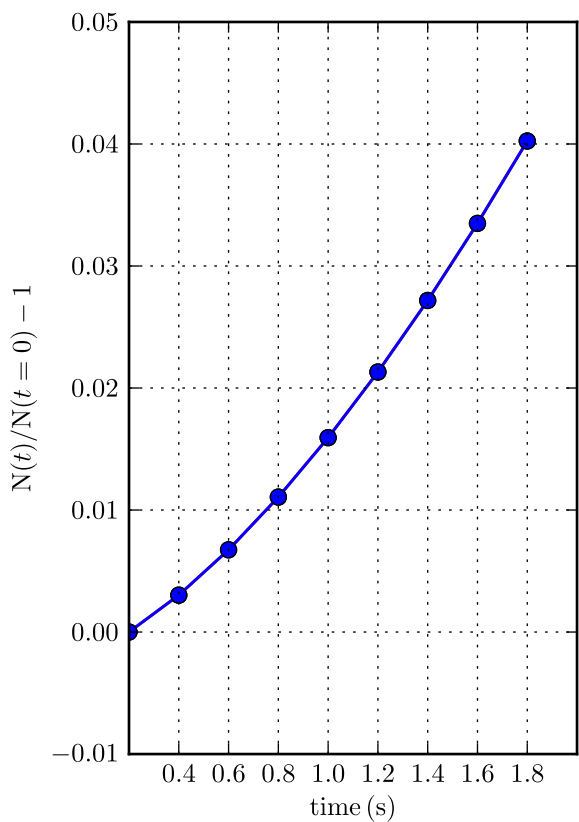
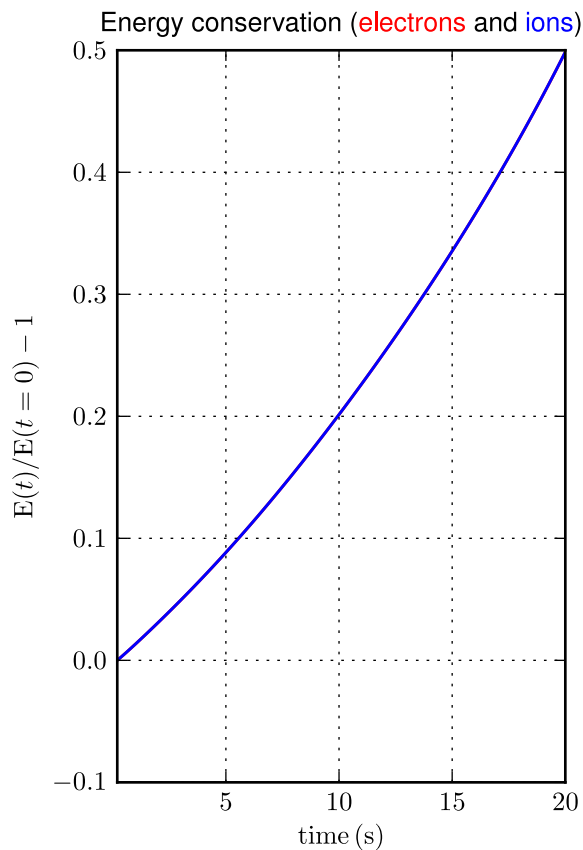
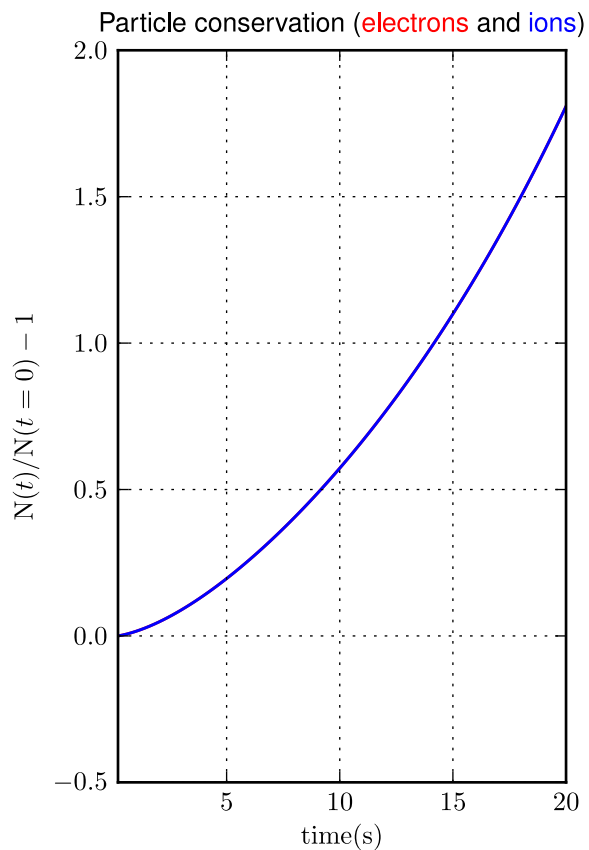
Comparison with initial solution - log scale; total time and zoom over time



Part. & Energy conservation

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

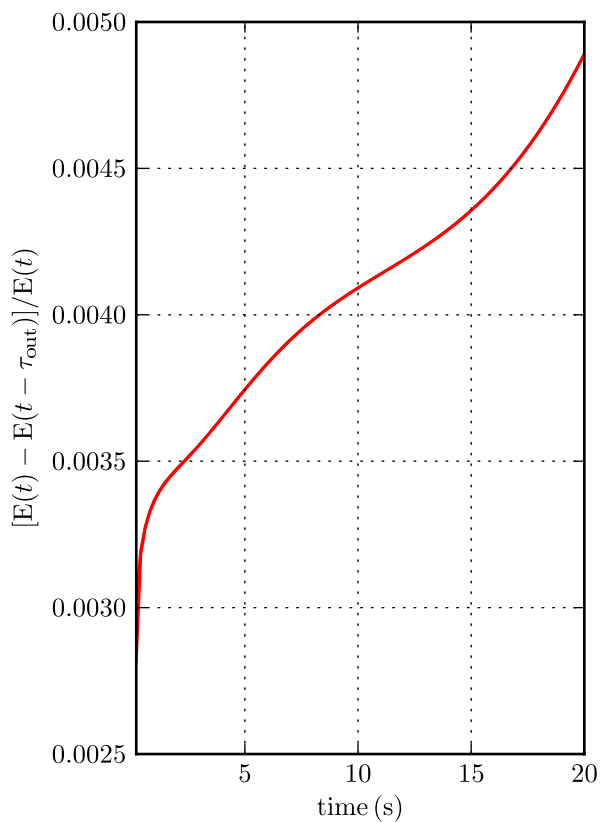
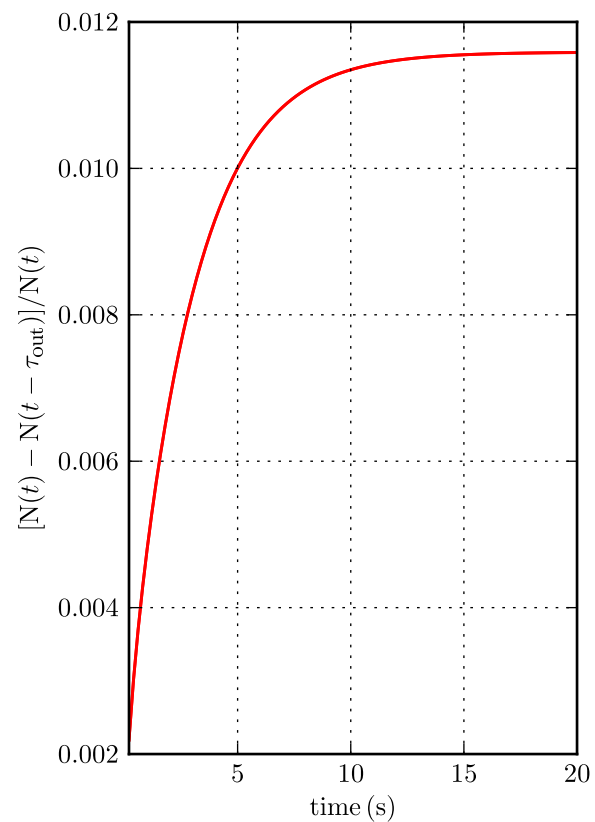
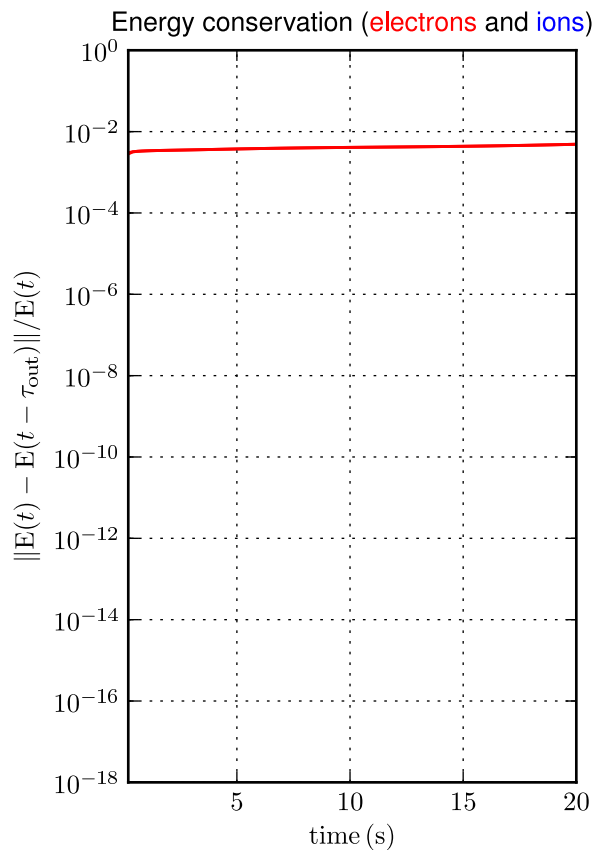
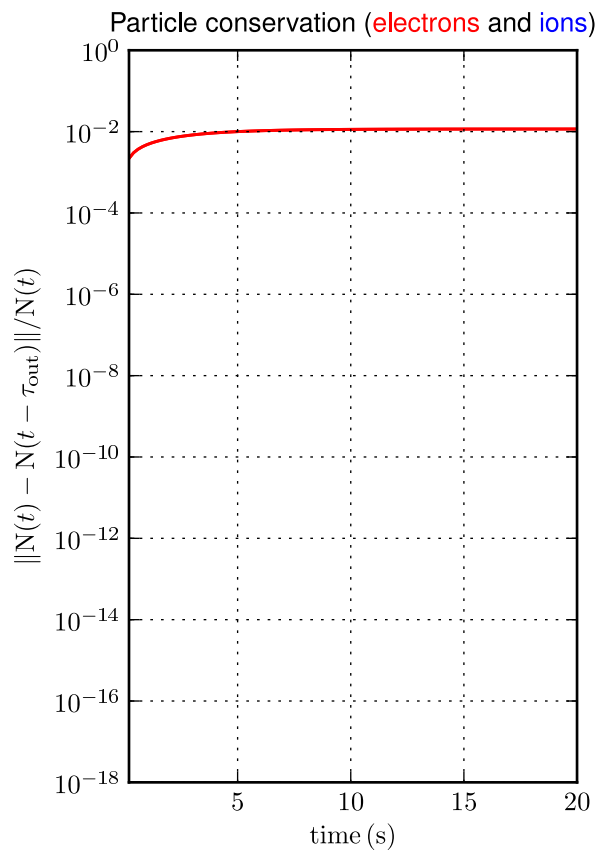
Comparison with initial solution - linear scale; total time and zoom over time



Part. & Energy conservation

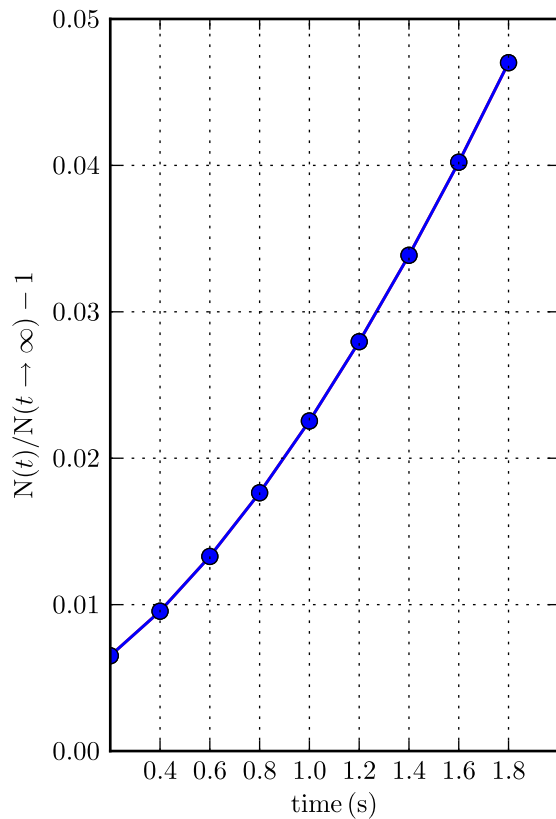
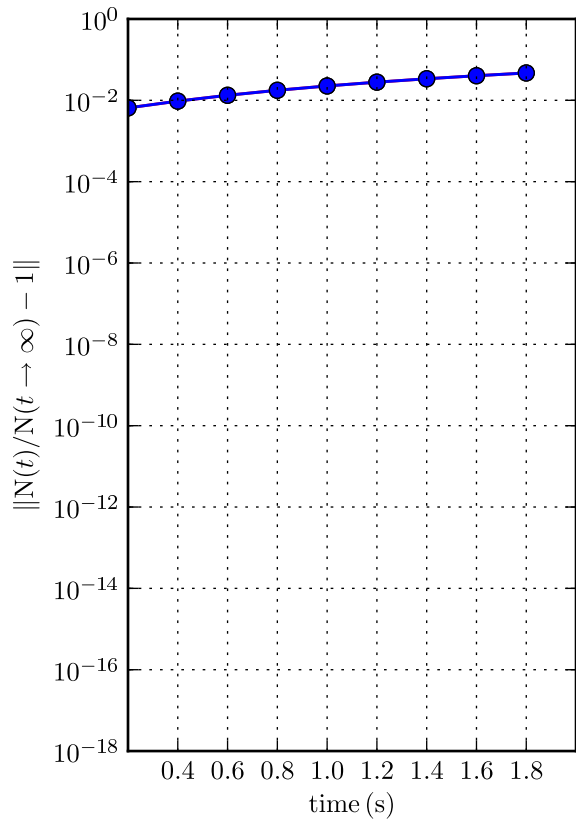
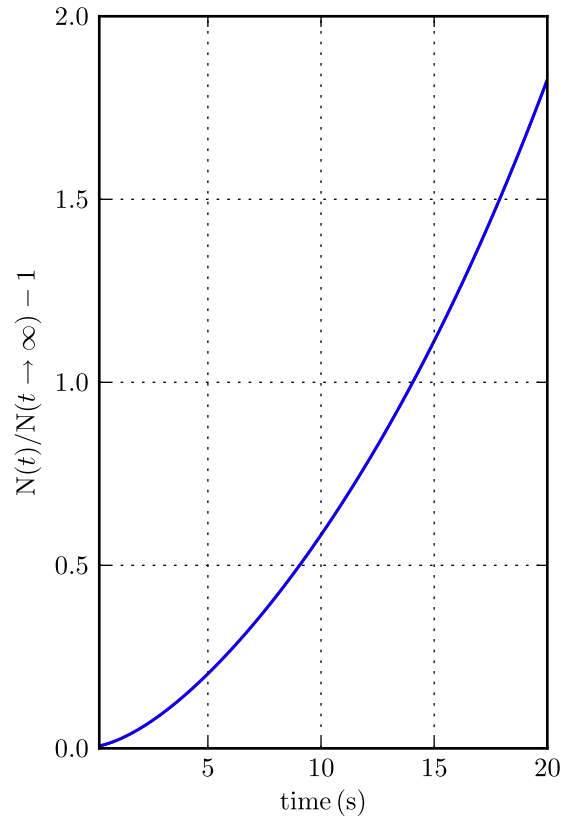
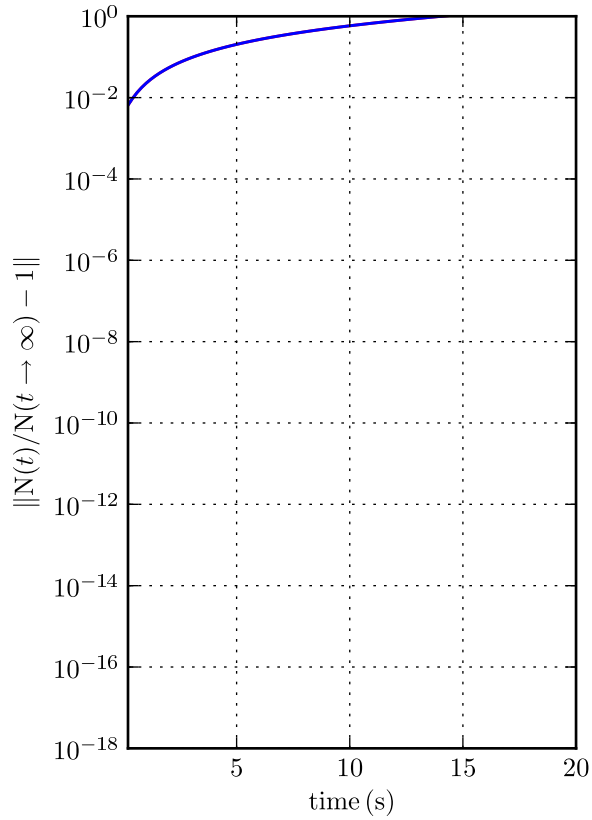
[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

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



Particle conservation

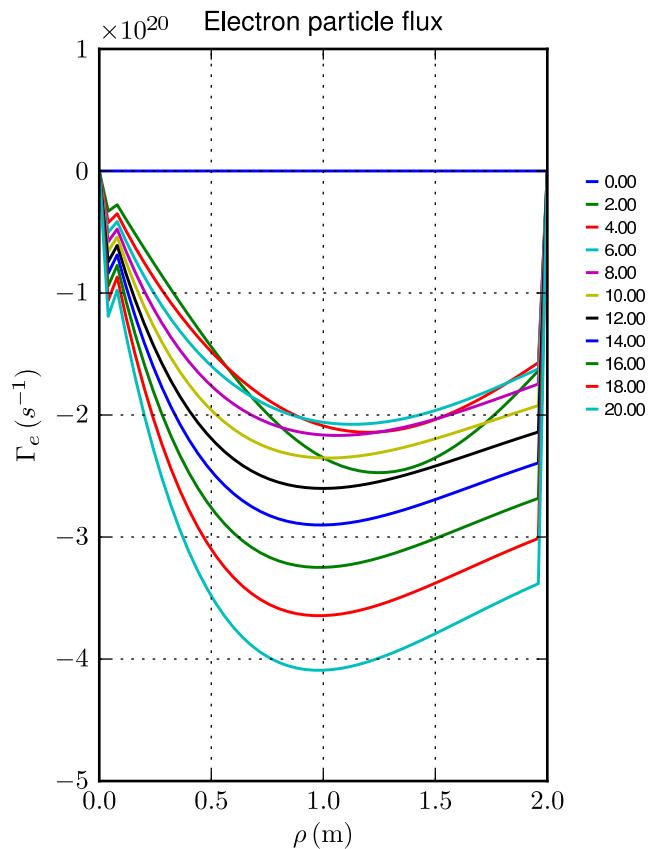
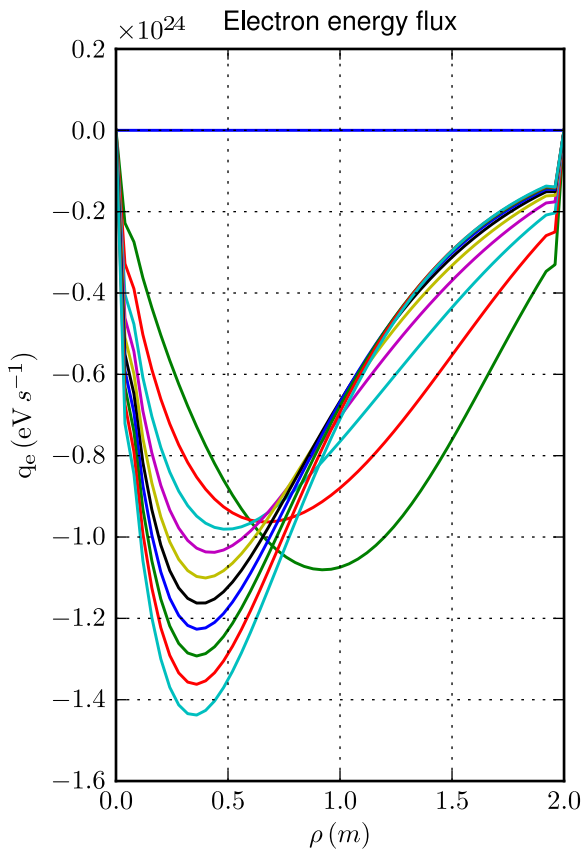
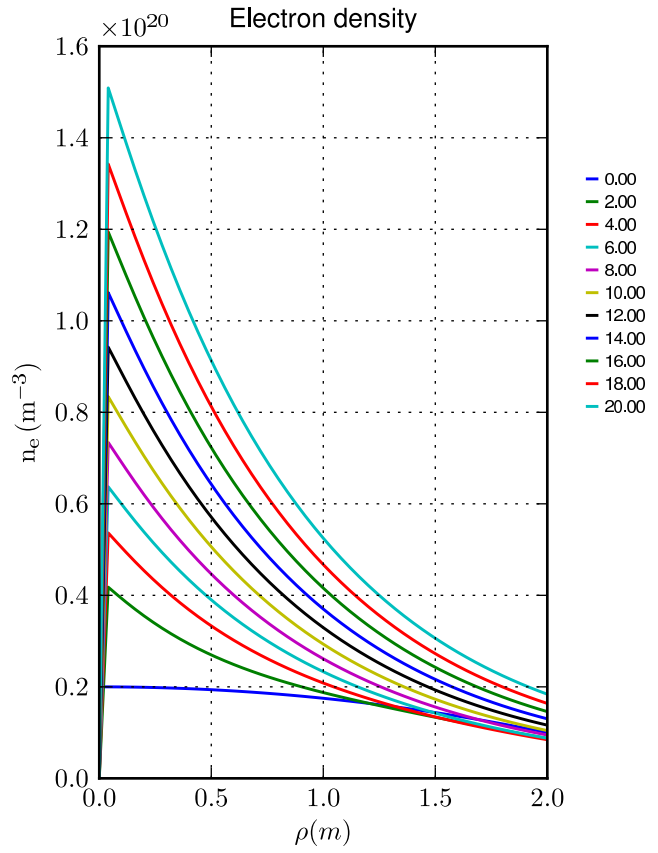
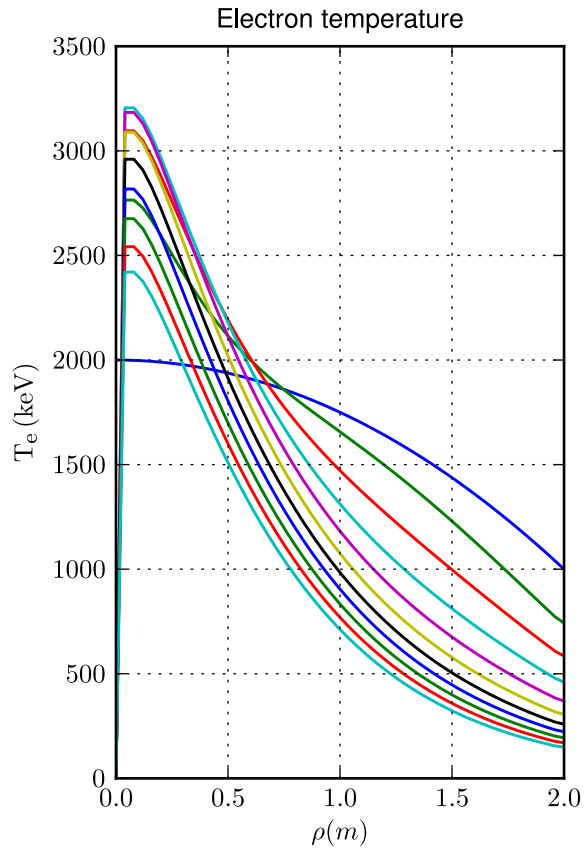
[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]
Comparison with asymptotic solution (electrons and ions); total time and zoom over time



Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

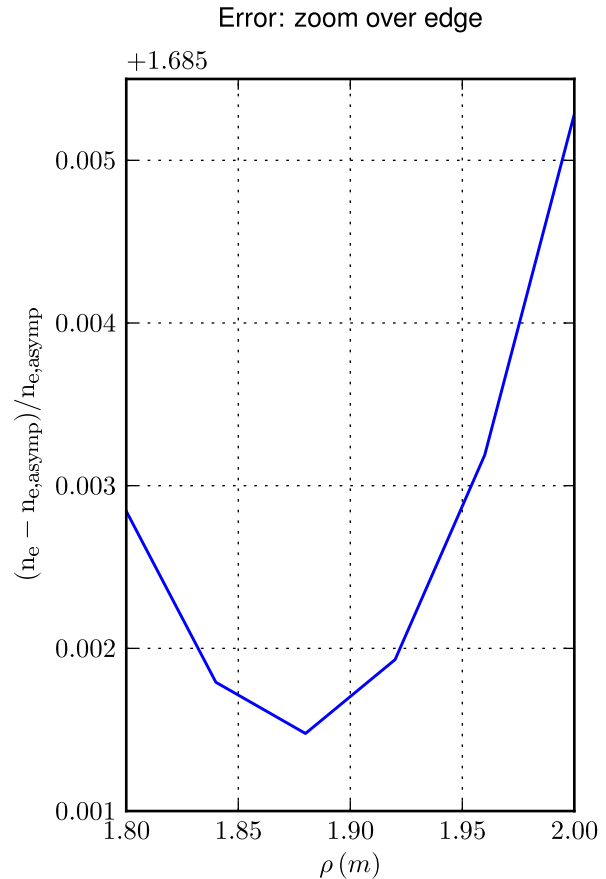
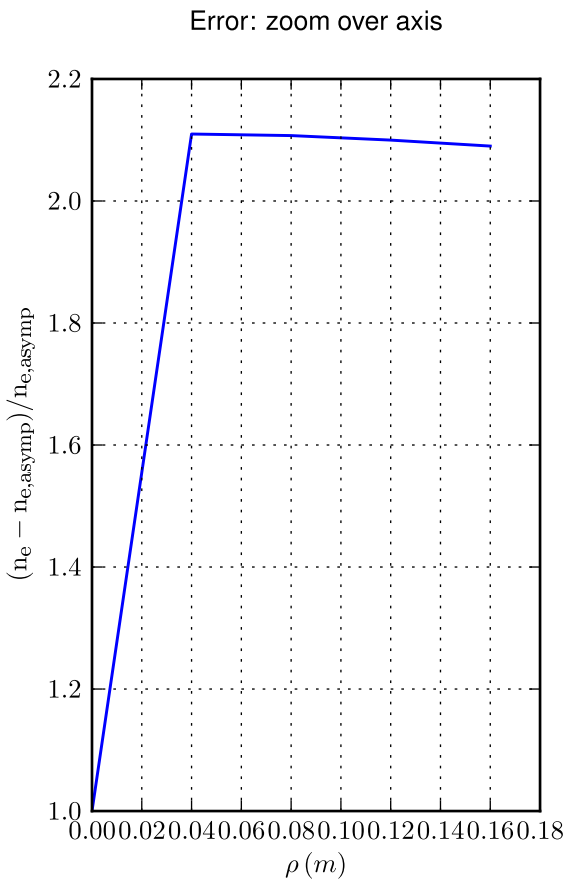
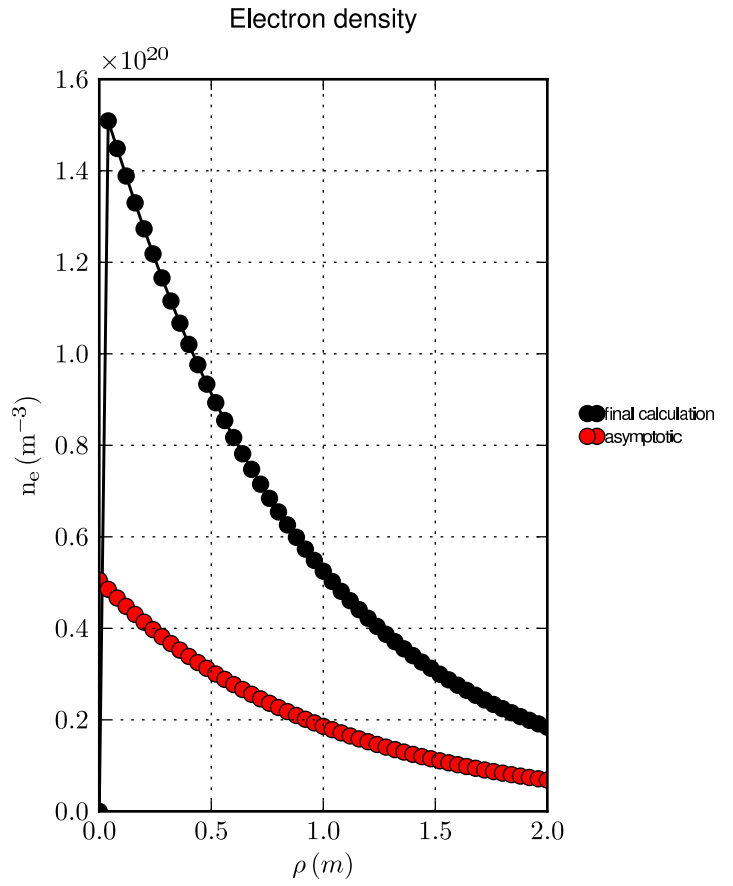
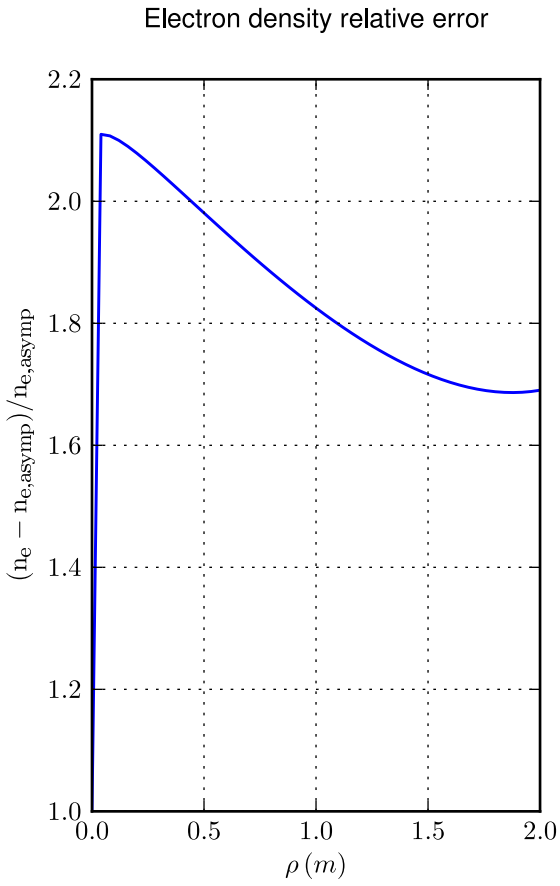
Time sampling: total simulation time/10



Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

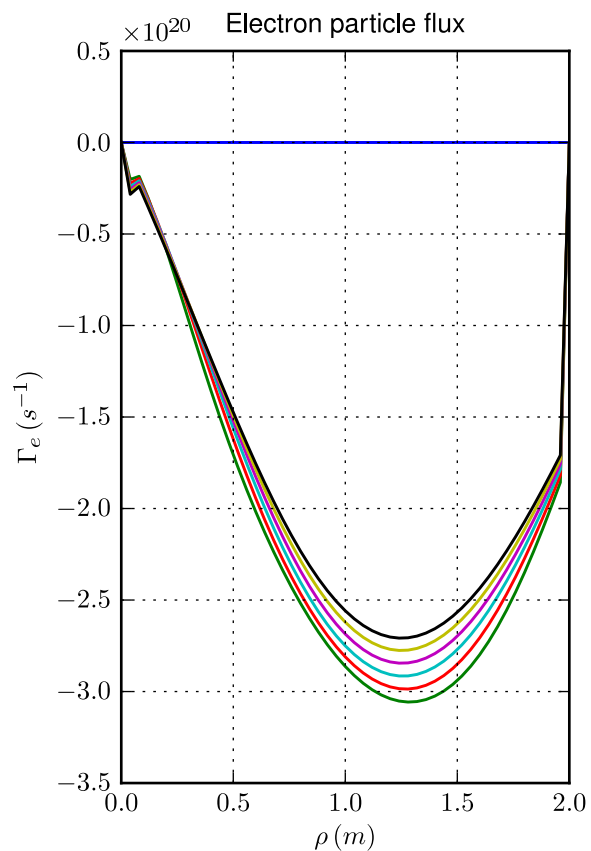
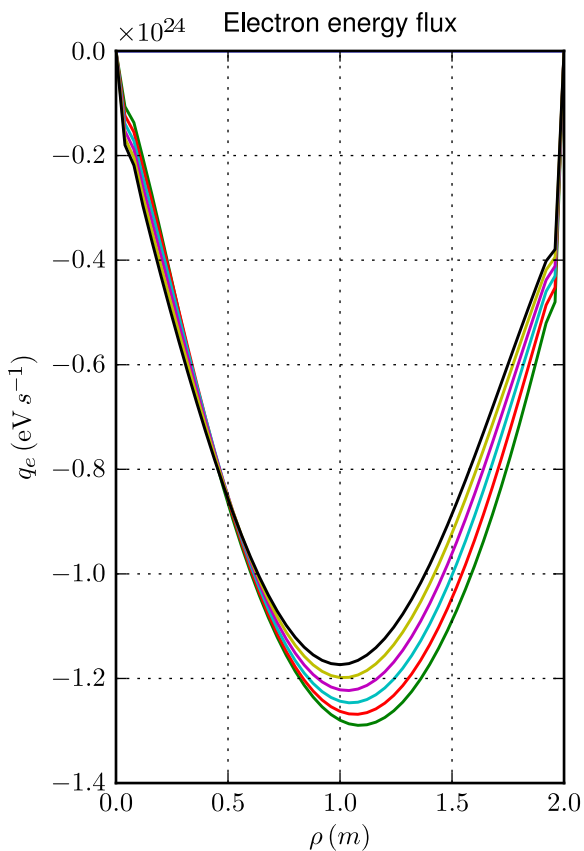
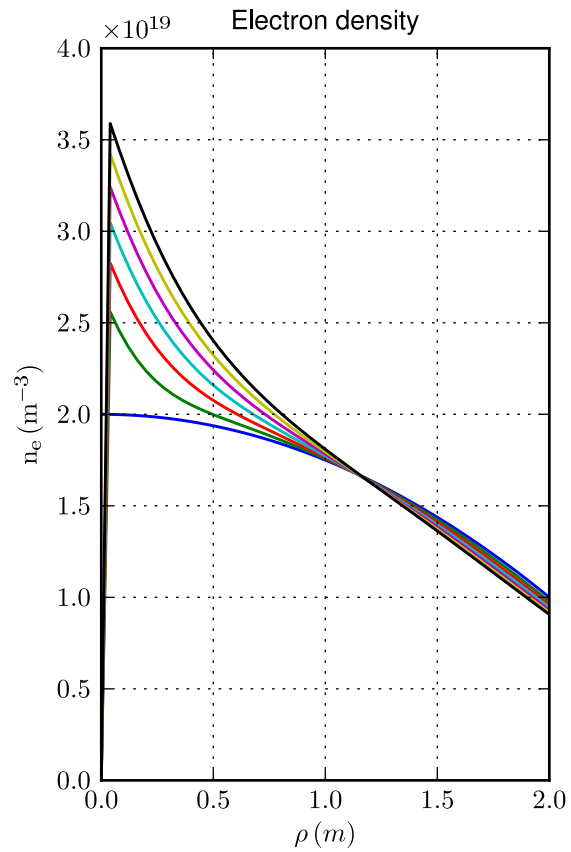
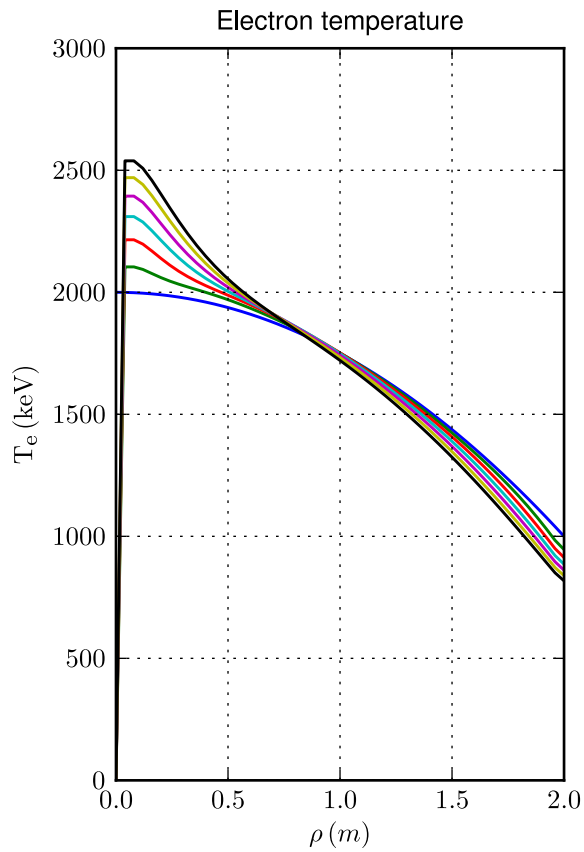
Comparison with asymptotic solution



Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$



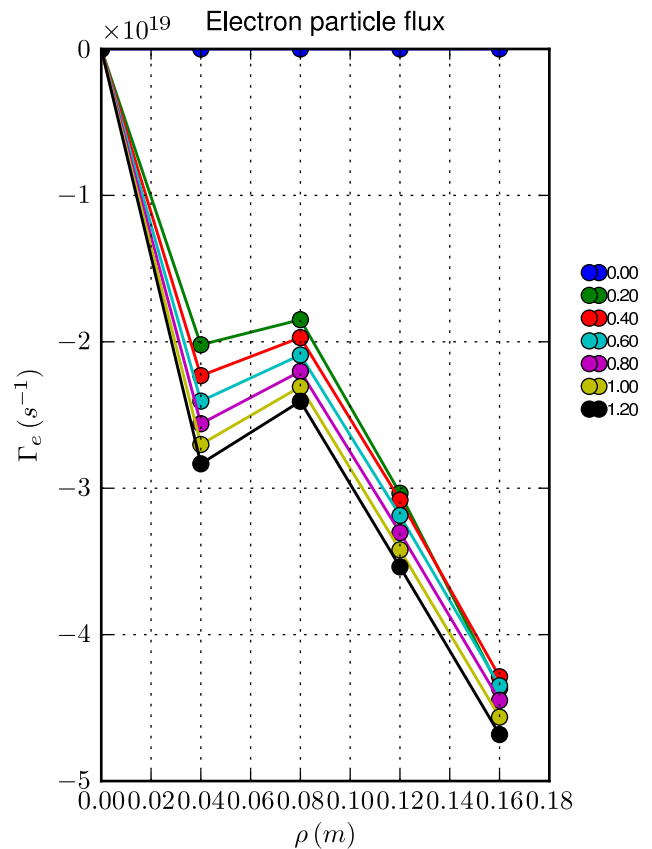
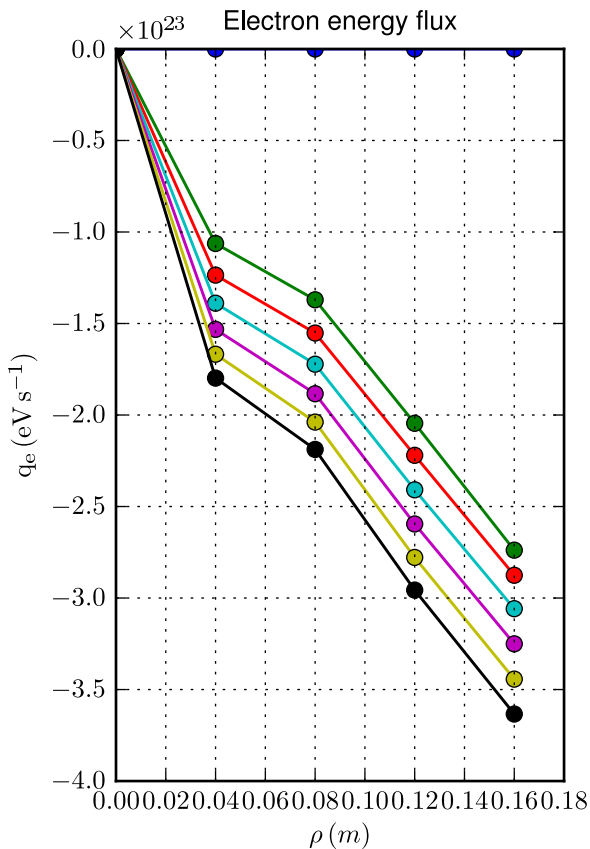
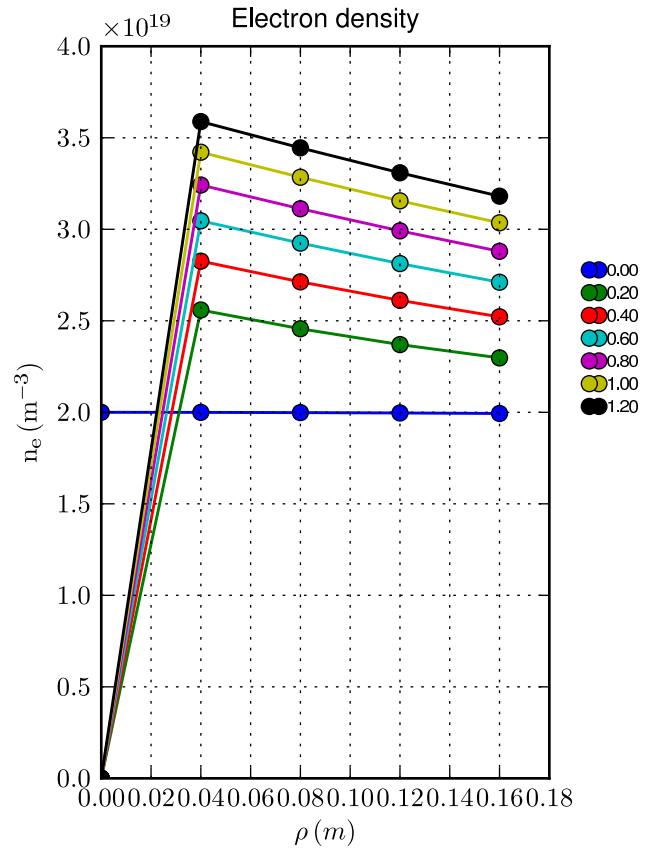
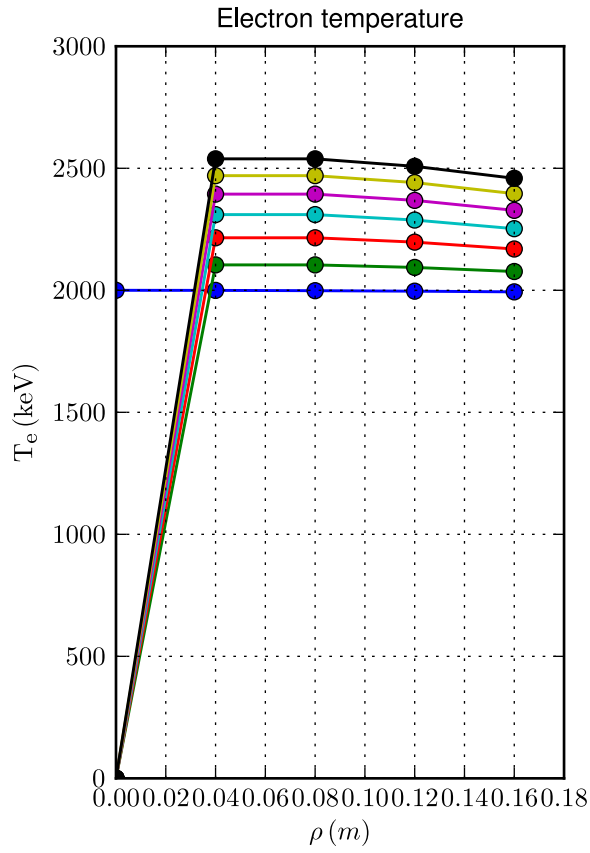
- 0.00
- 0.20
- 0.40
- 0.60
- 0.80
- 1.00
- 1.20

Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$

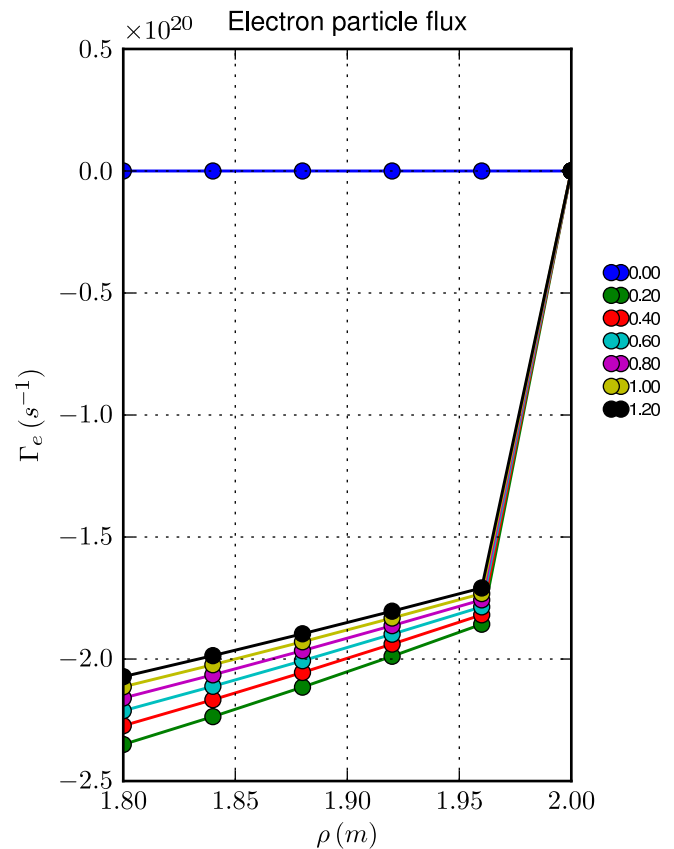
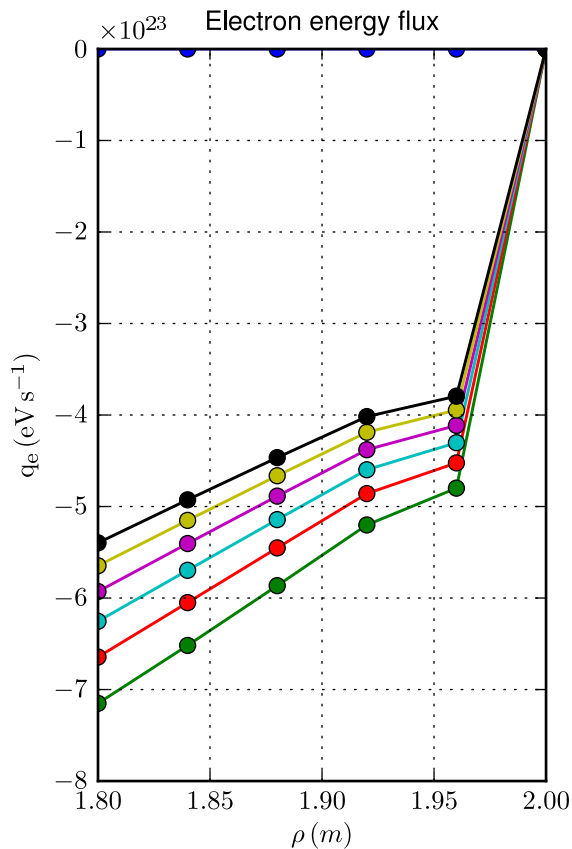
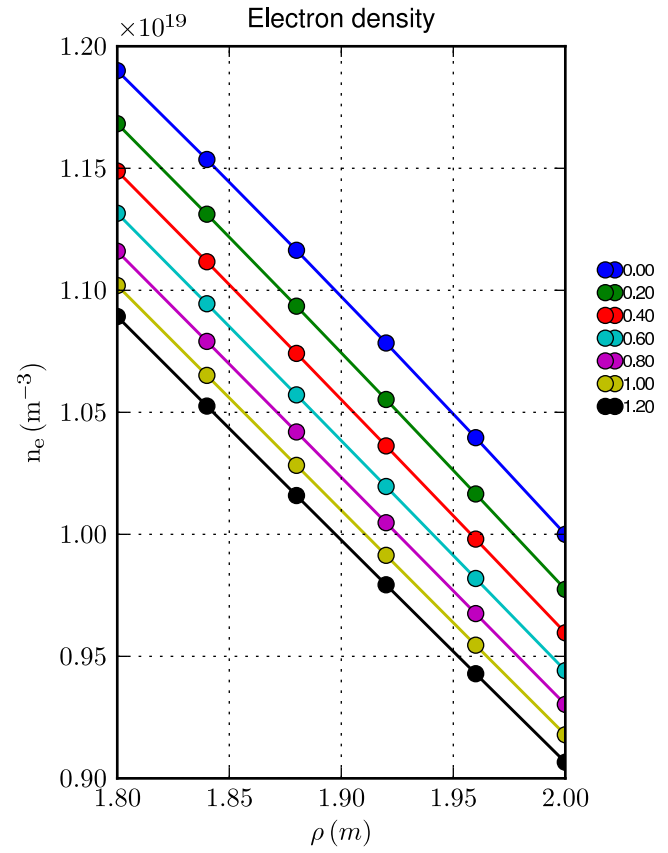
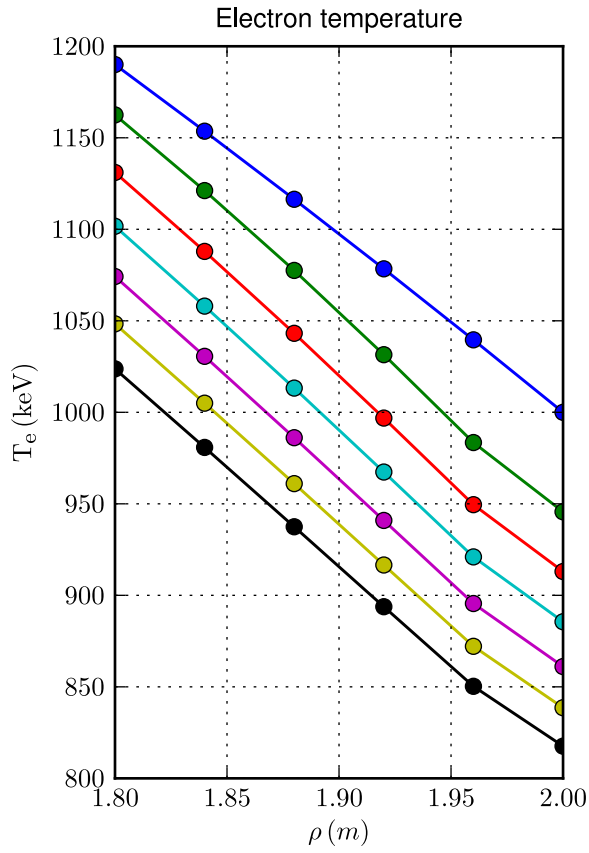


Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Spatial zoom over edge

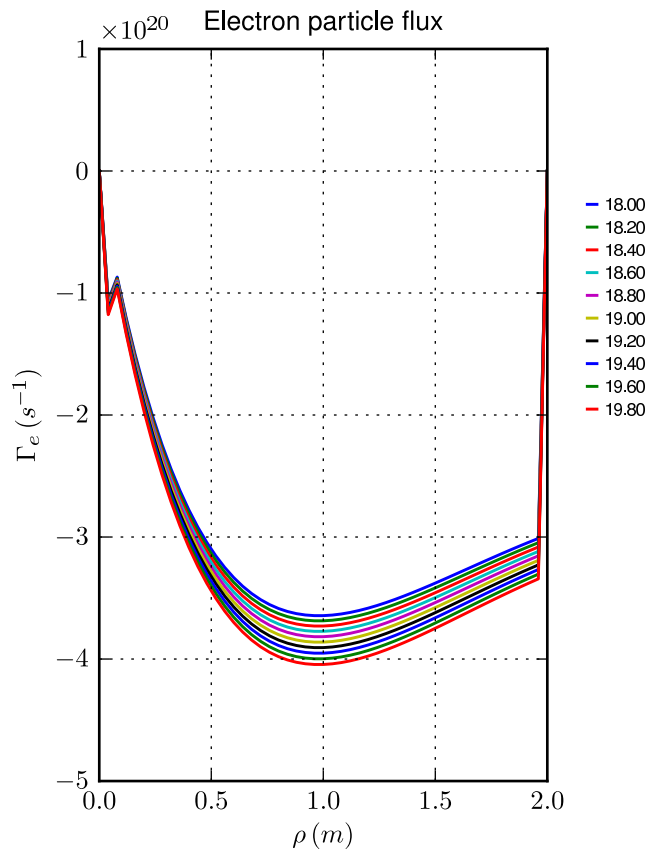
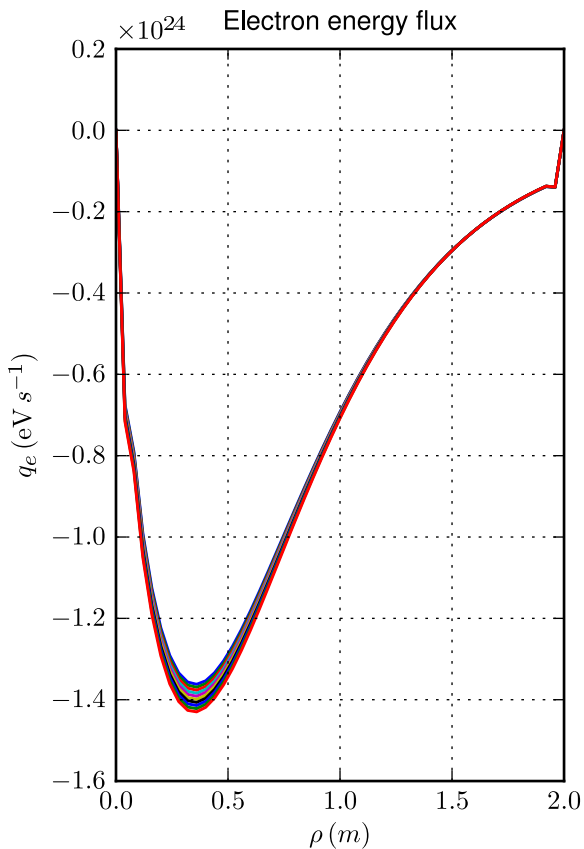
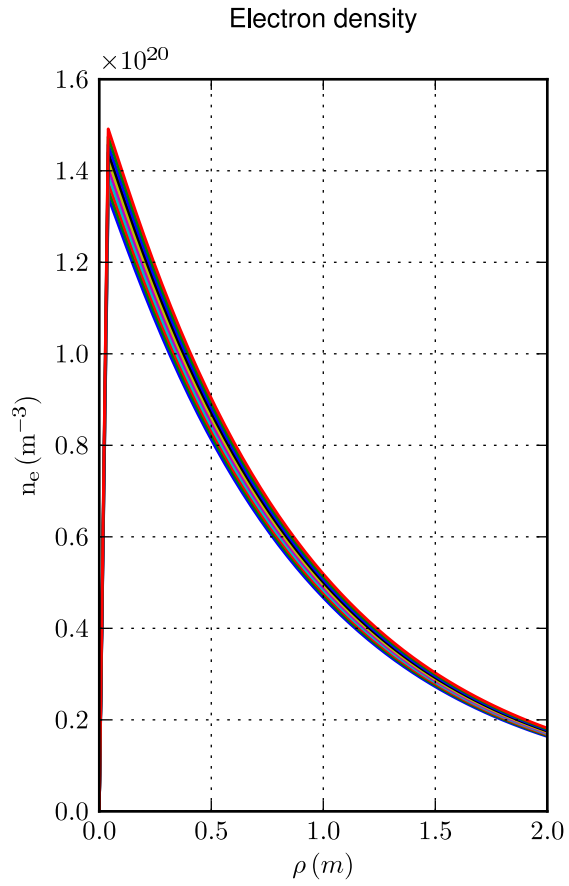
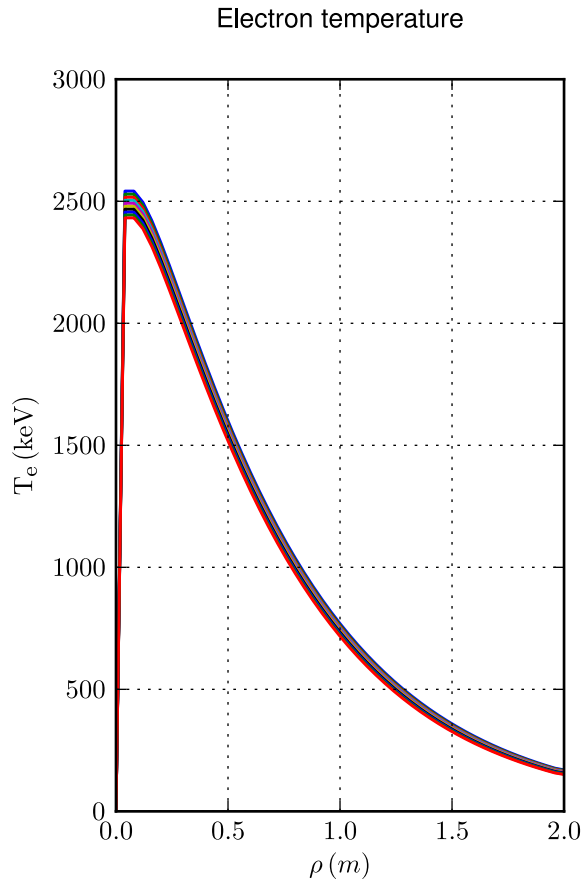
Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$



Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

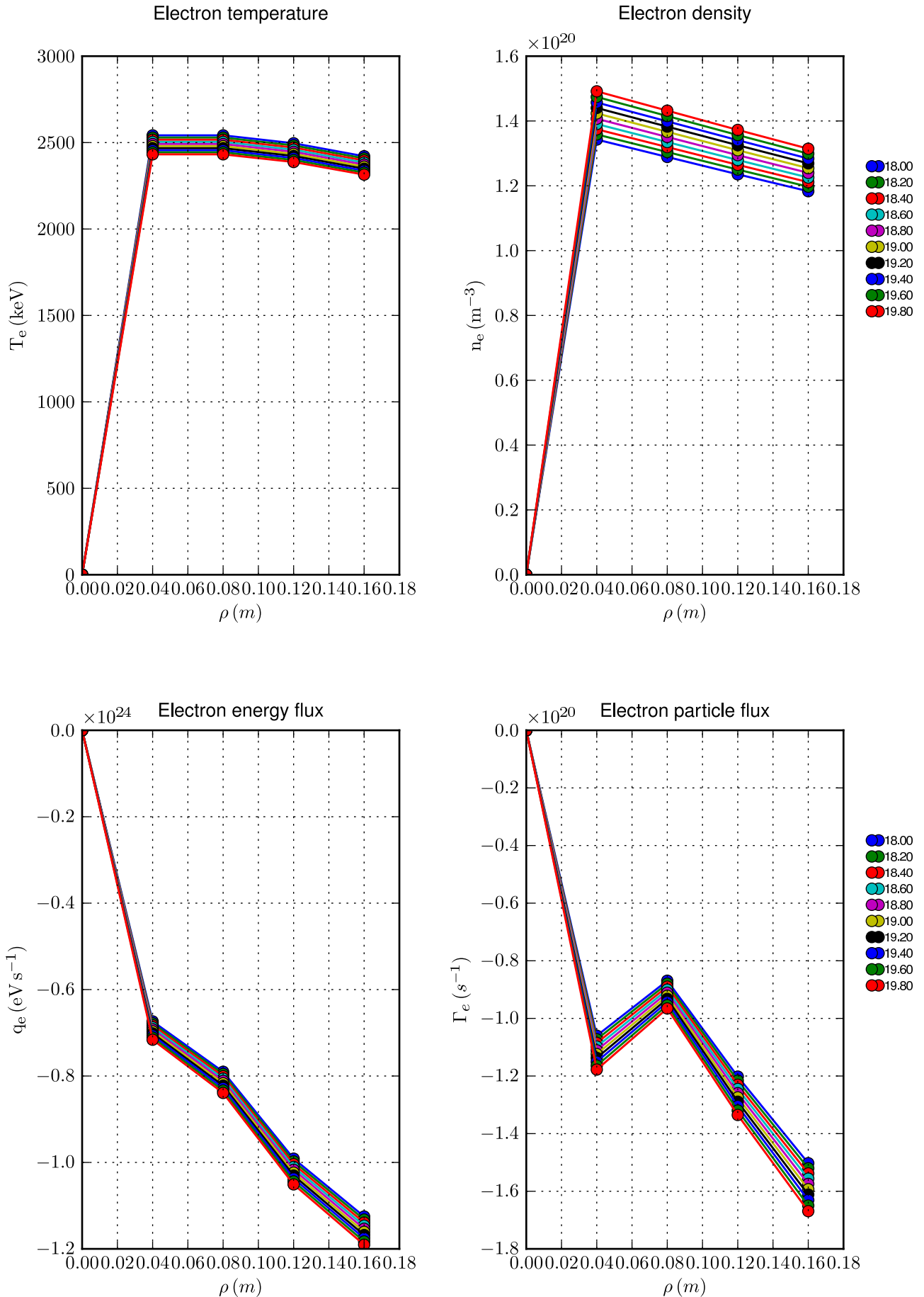
Time sampling: last 10 time slices



Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

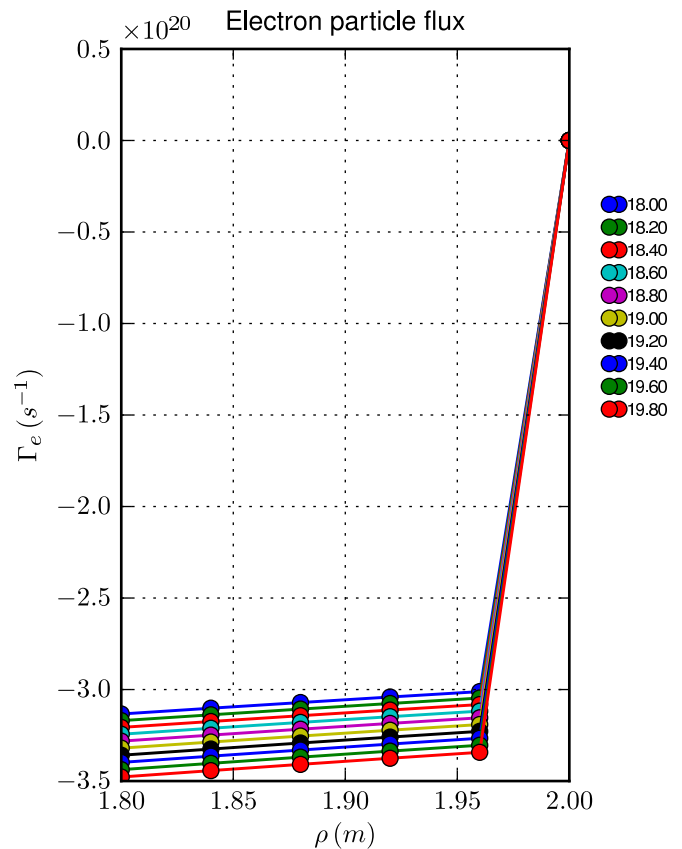
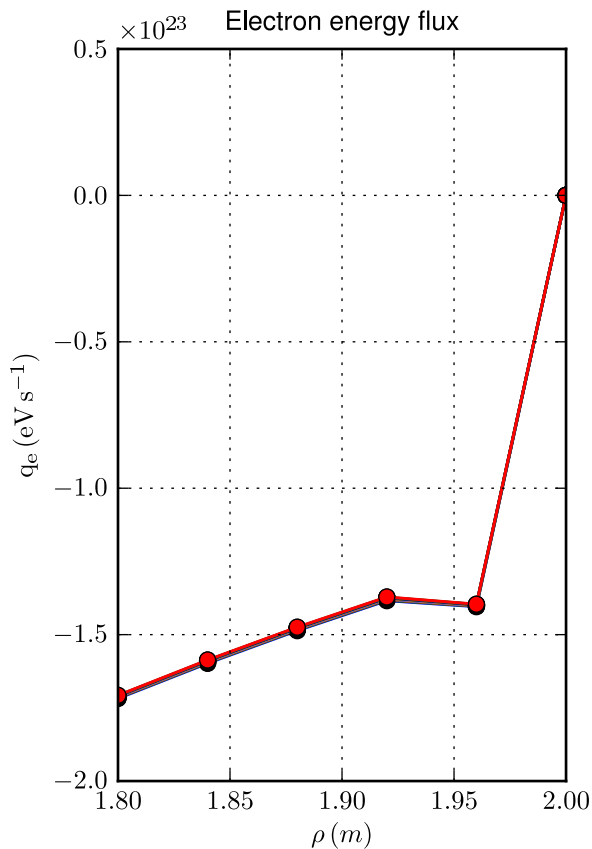
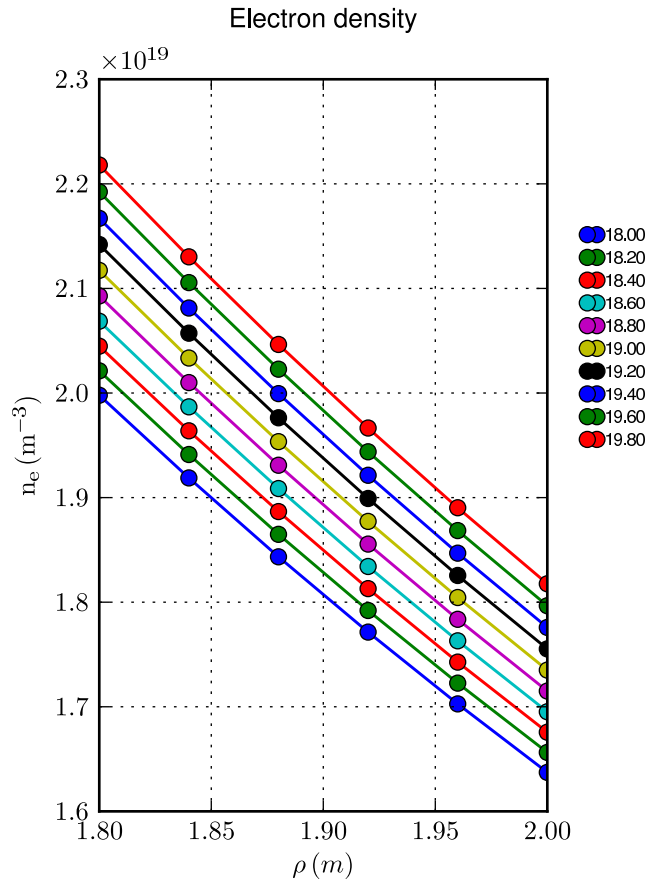
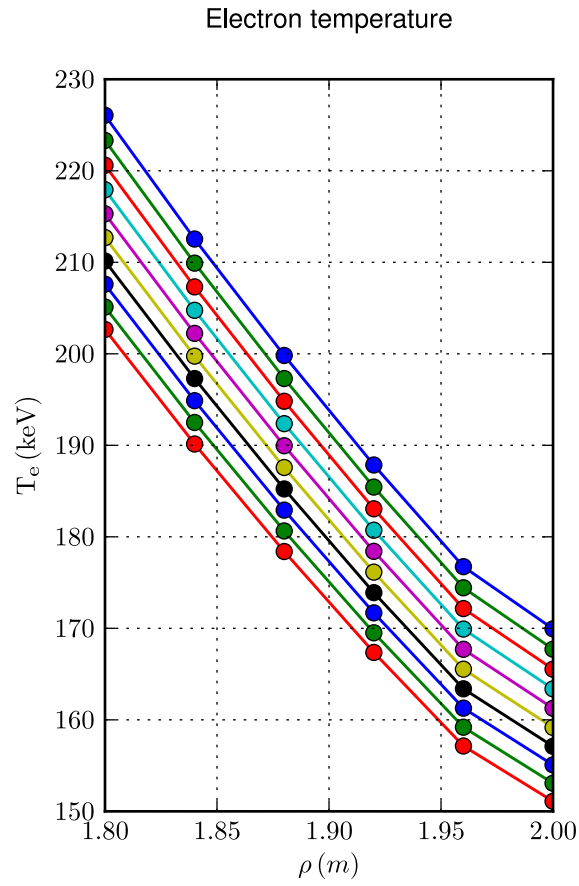
Spatial zoom over magnetic axis; time sampling: last 10 time slices



Profiles

[Case: I.1.5.h, Solver: 7, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

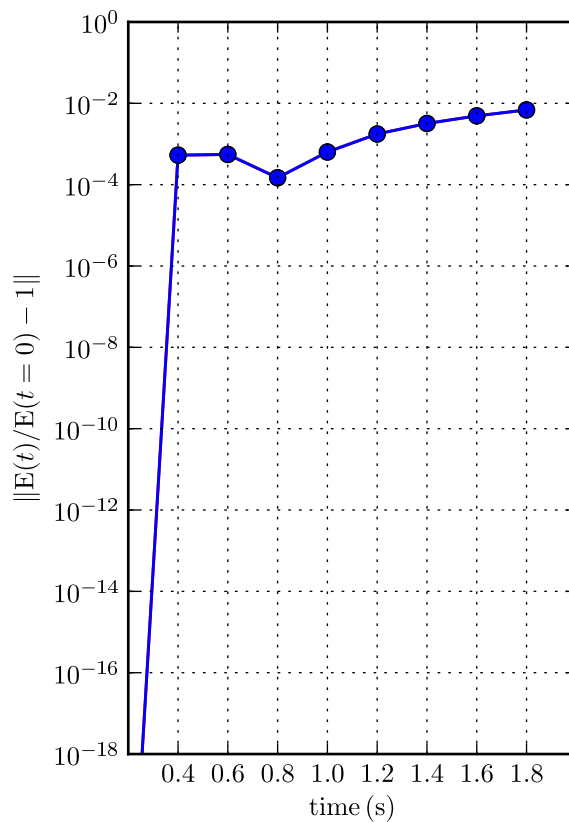
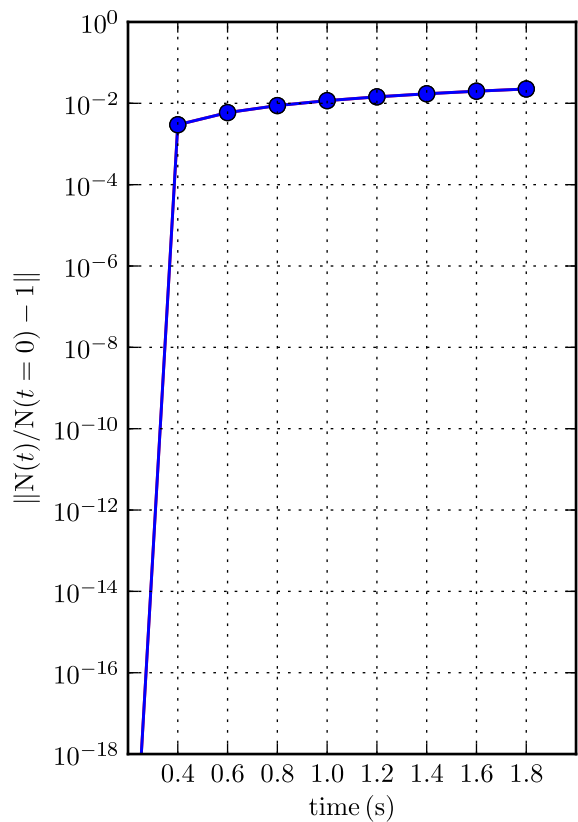
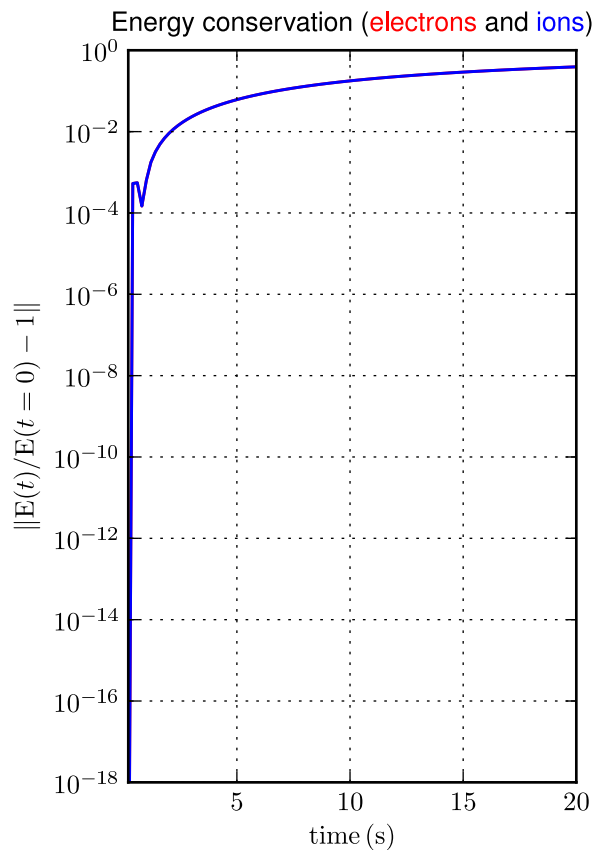
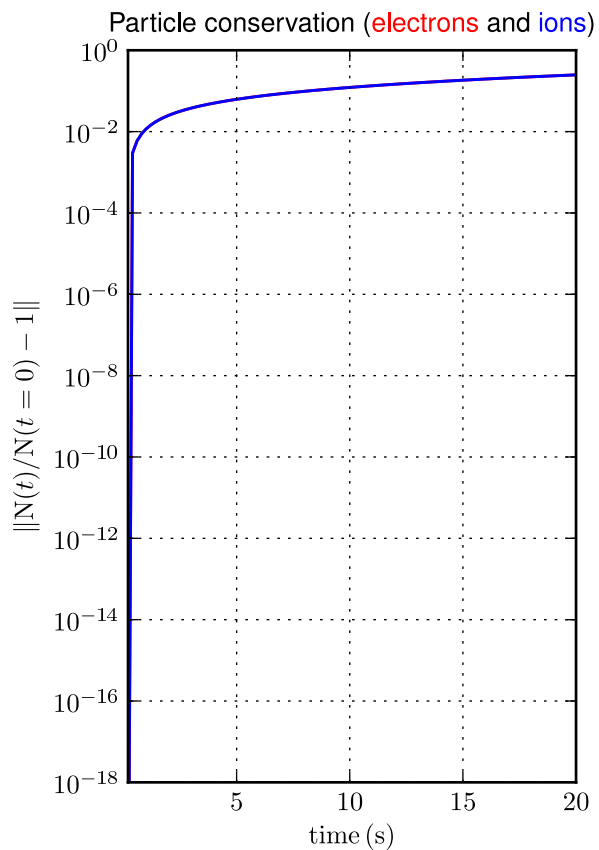
Spatial zoom over edge; time sampling: last 10 time slices



Part. & Energy conservation

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

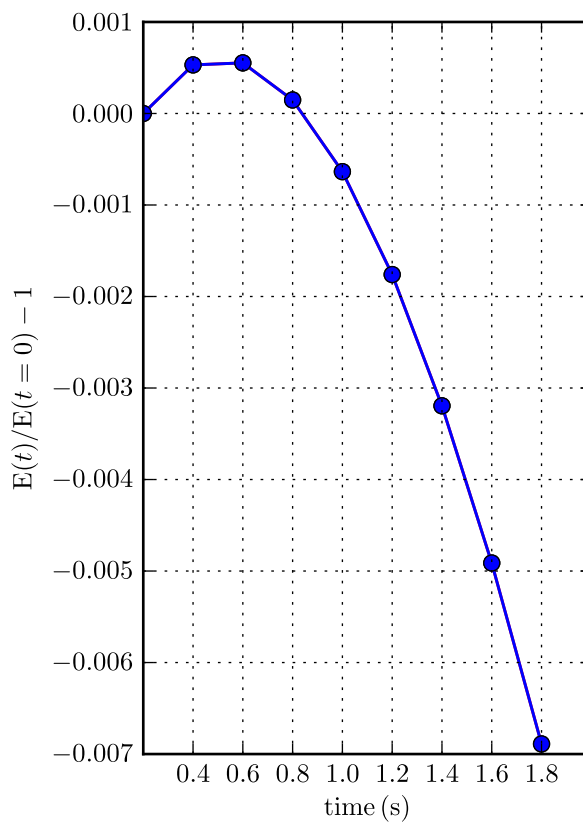
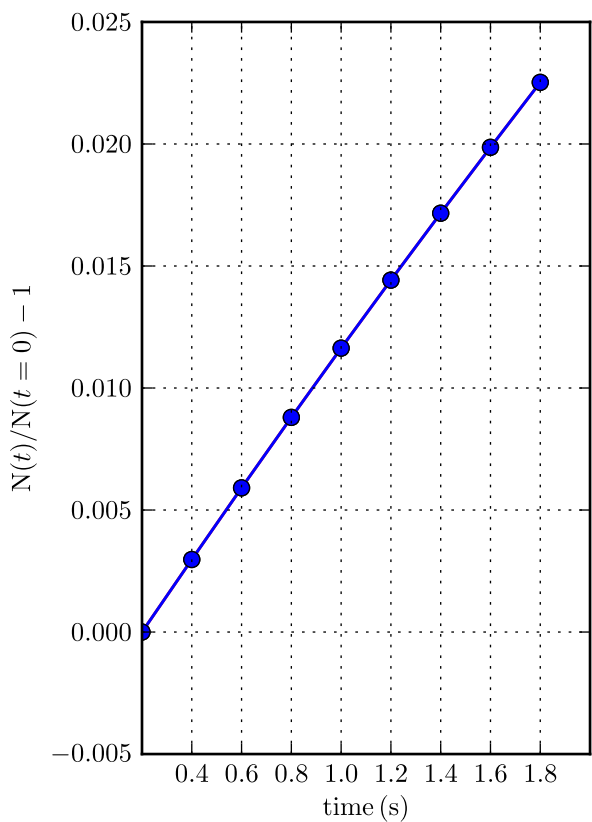
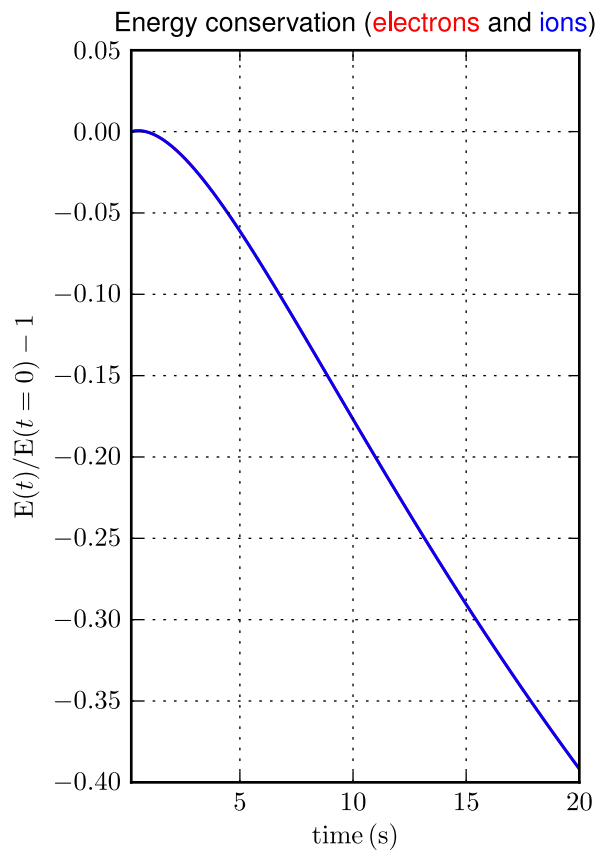
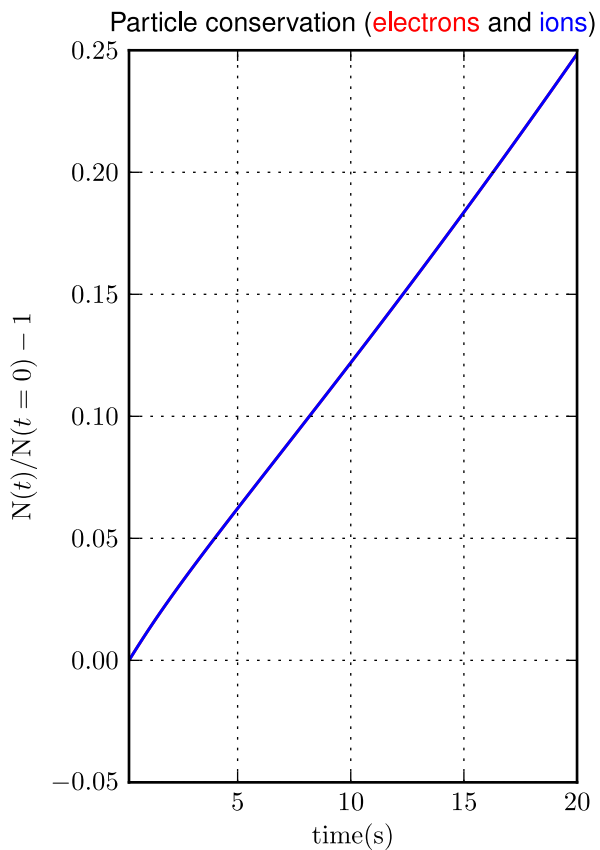
Comparison with initial solution - log scale; total time and zoom over time



Part. & Energy conservation

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

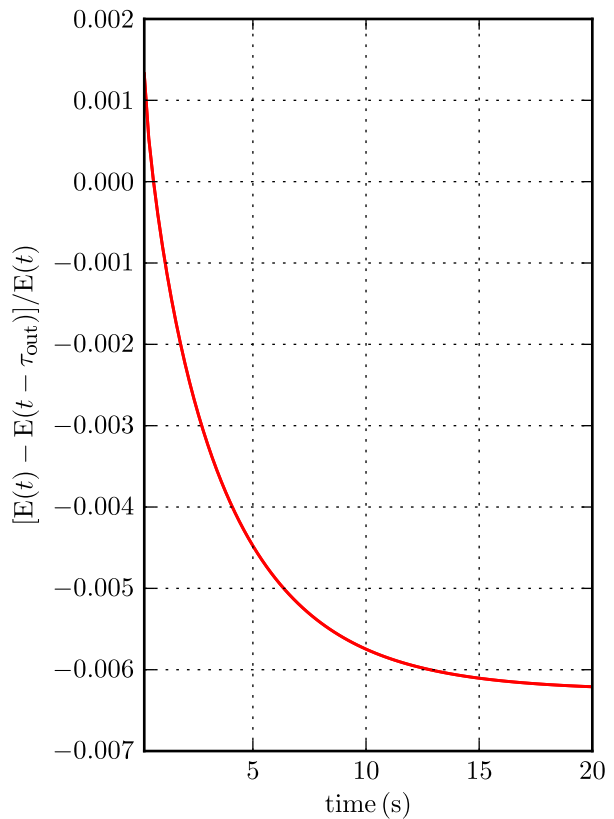
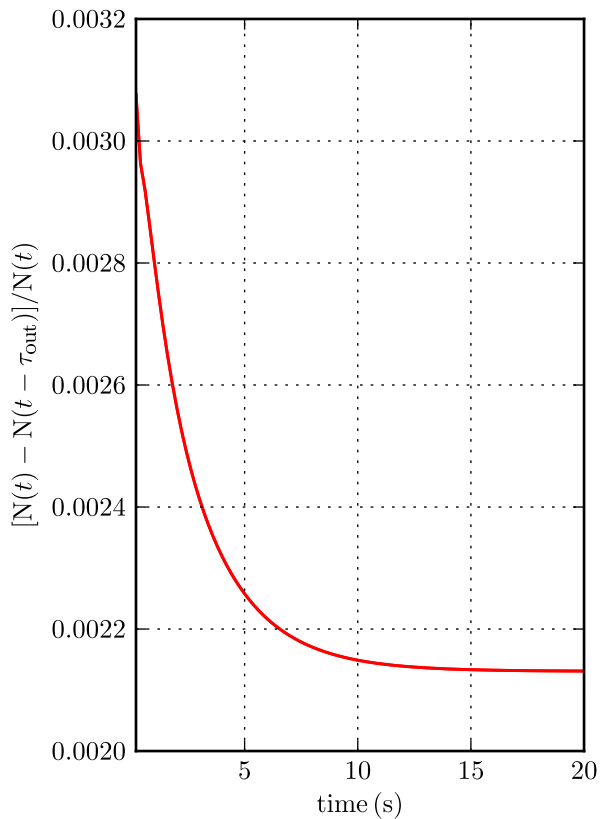
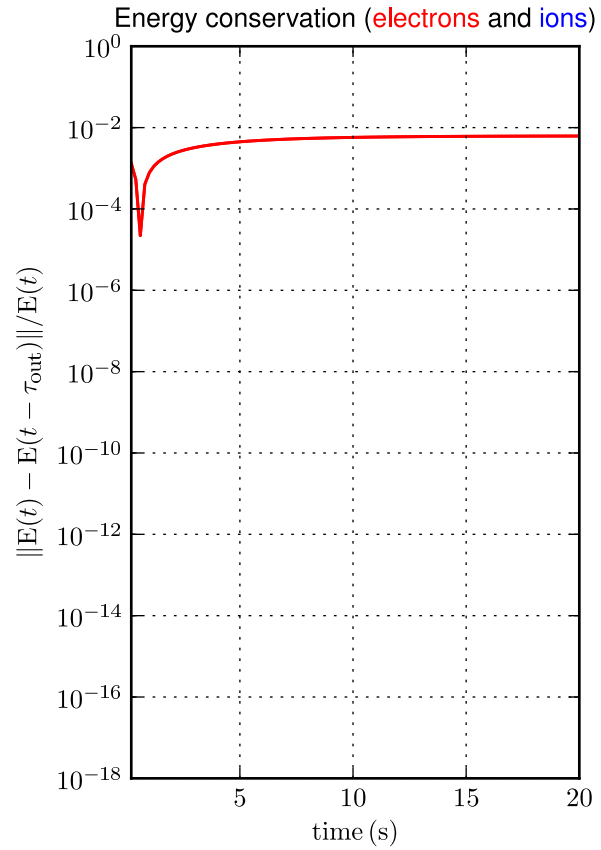
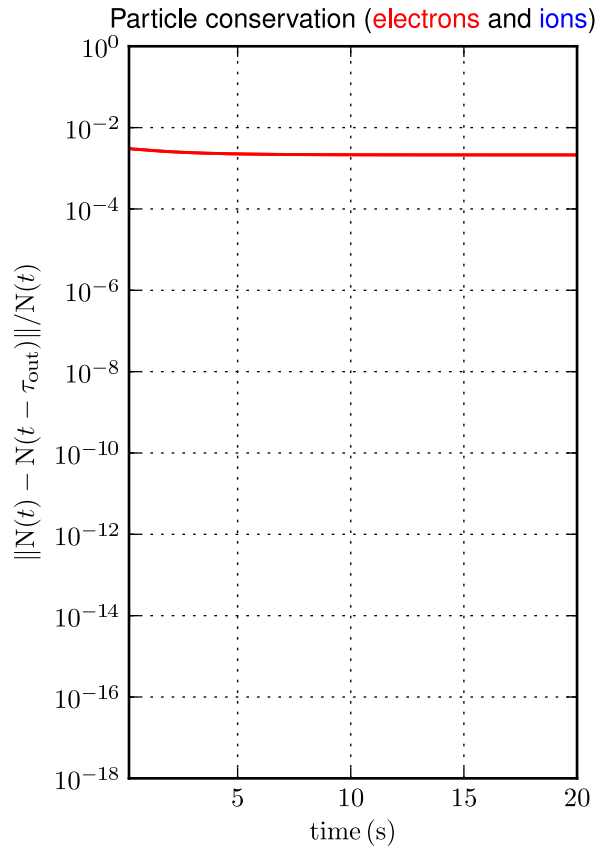
Comparison with initial solution - linear scale; total time and zoom over time



Part. & Energy conservation

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

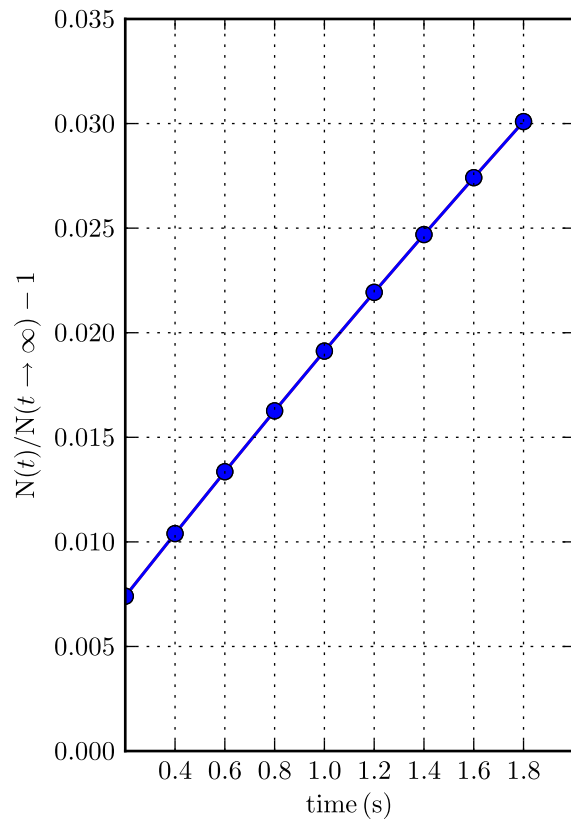
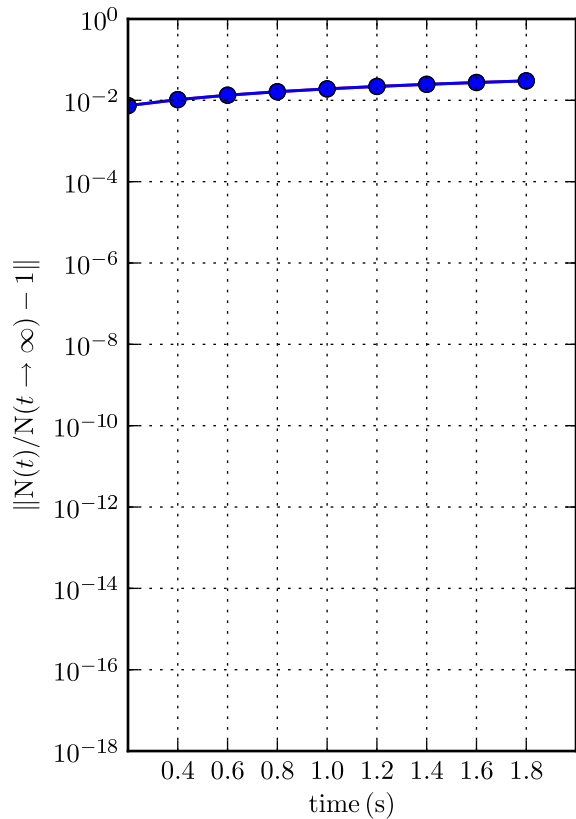
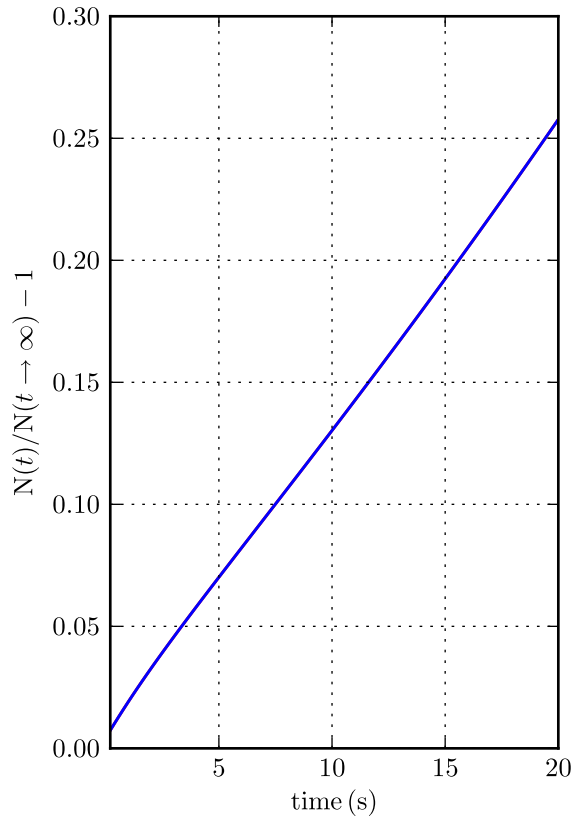
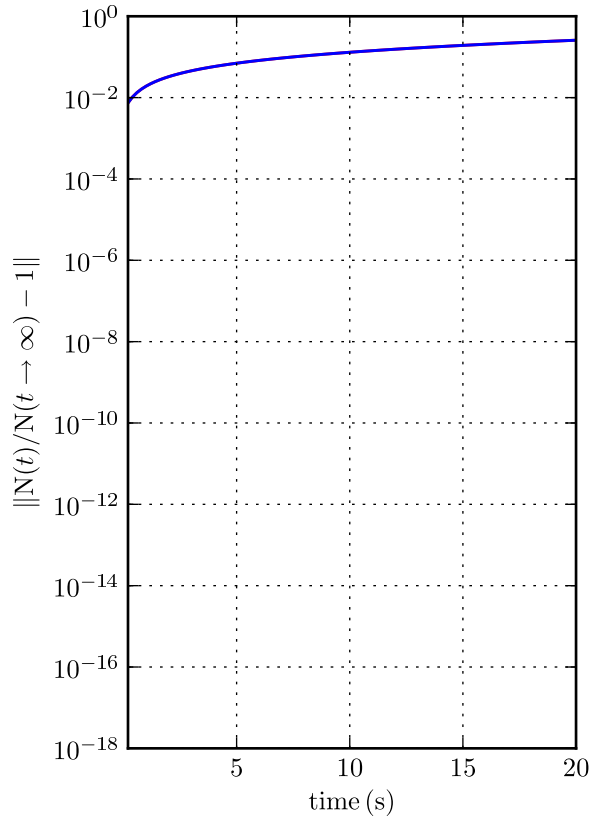
Comparison with previous time-sampled (τ_{out}) solution - log and linear scales



Particle conservation

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

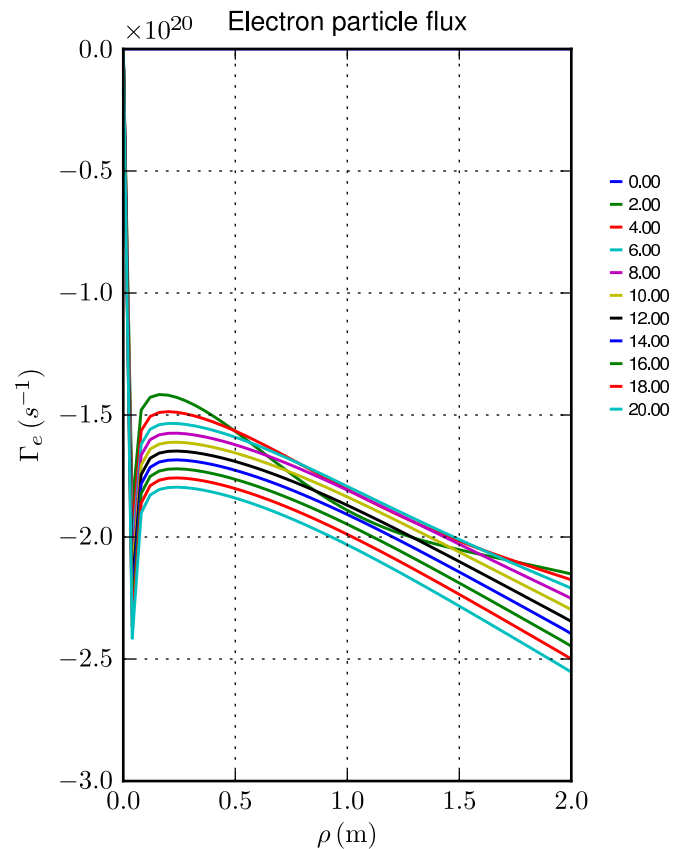
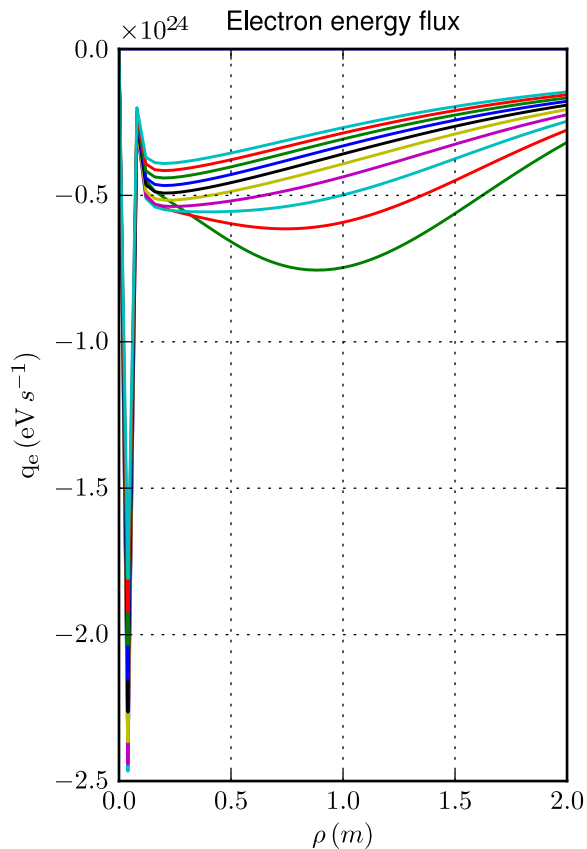
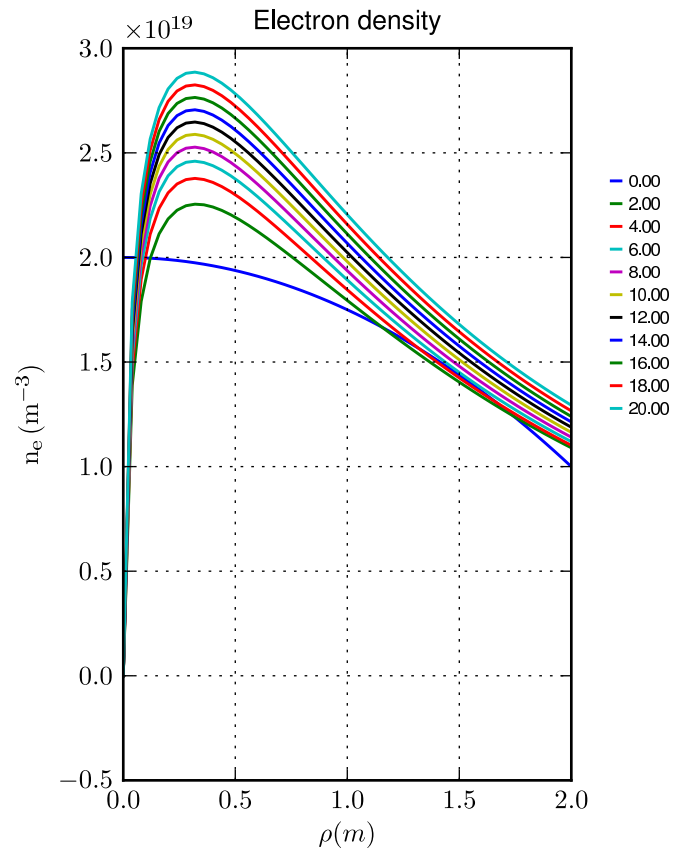
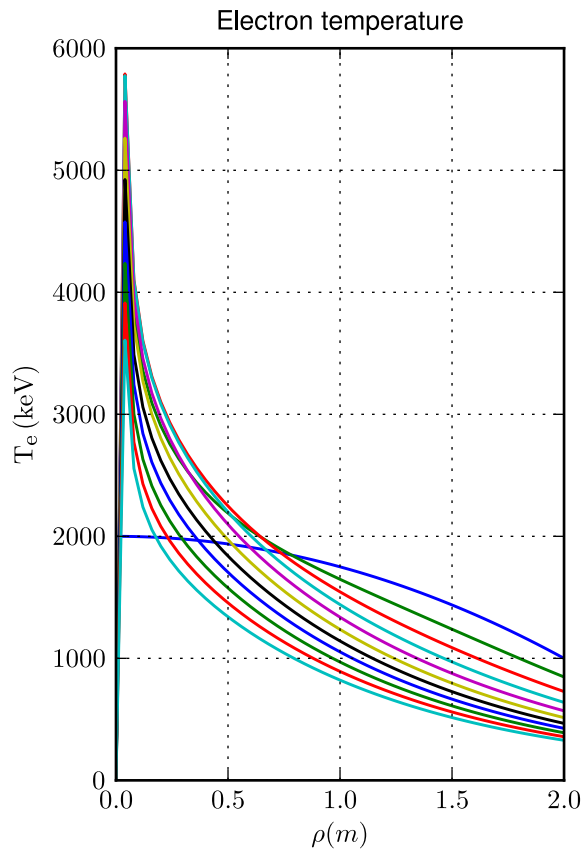
Comparison with asymptotic solution (electrons and ions); total time and zoom over time



Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

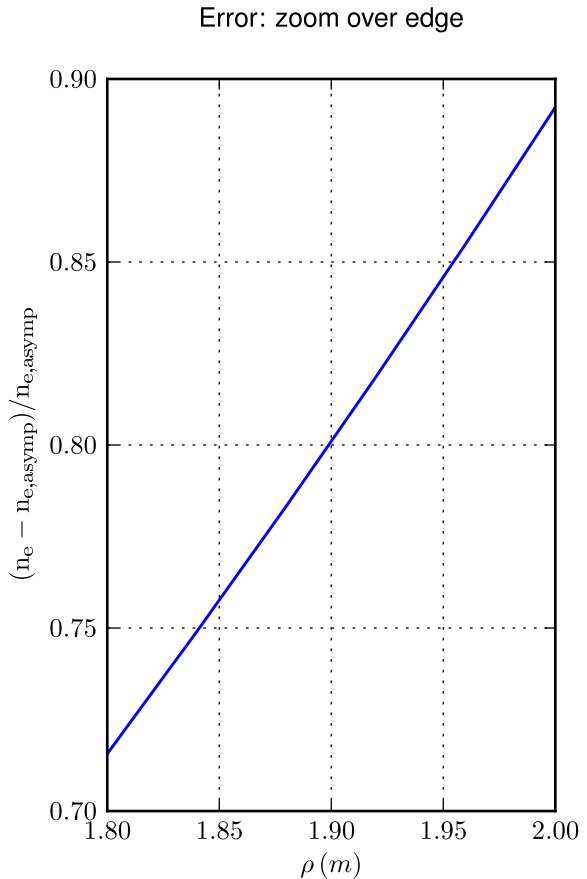
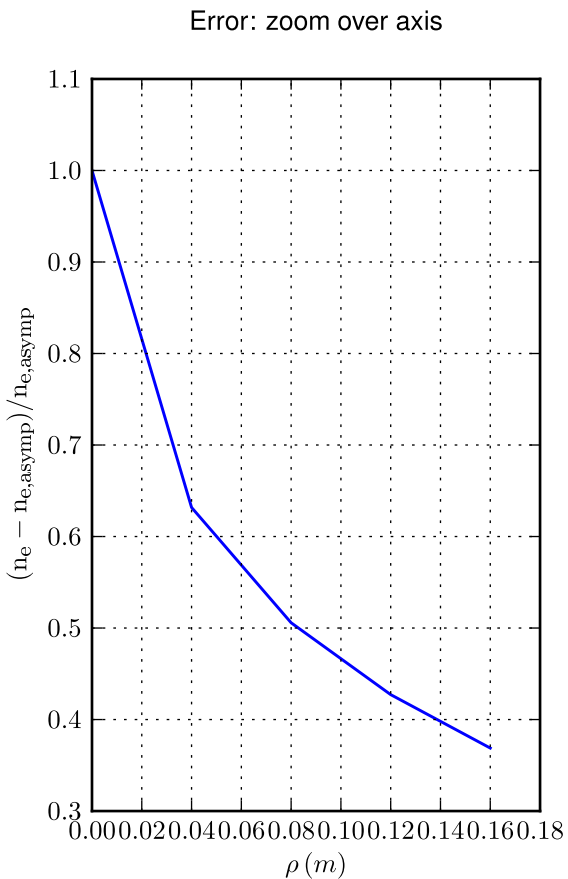
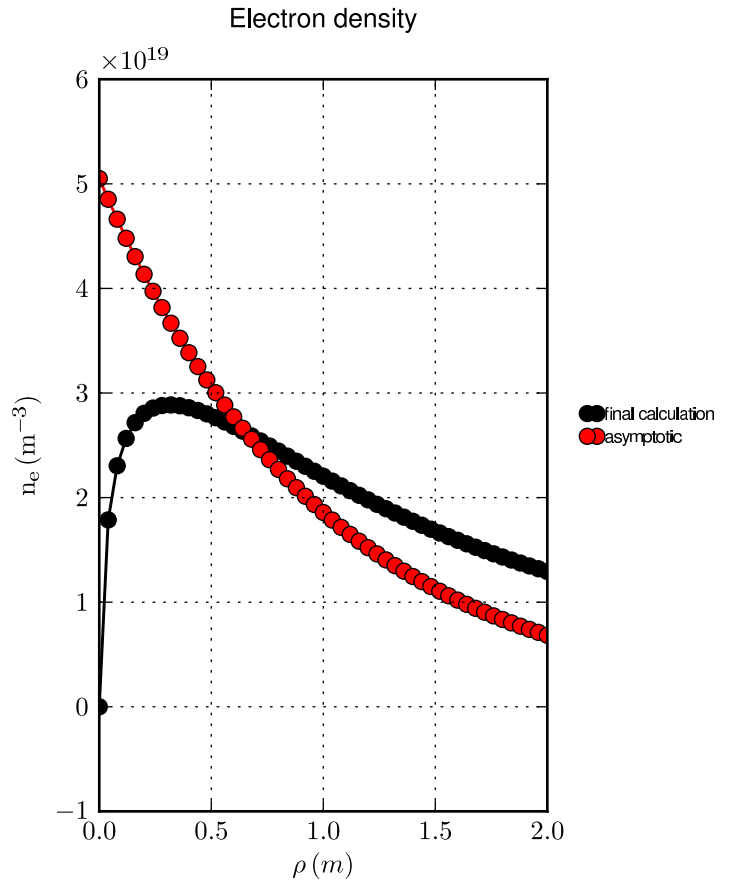
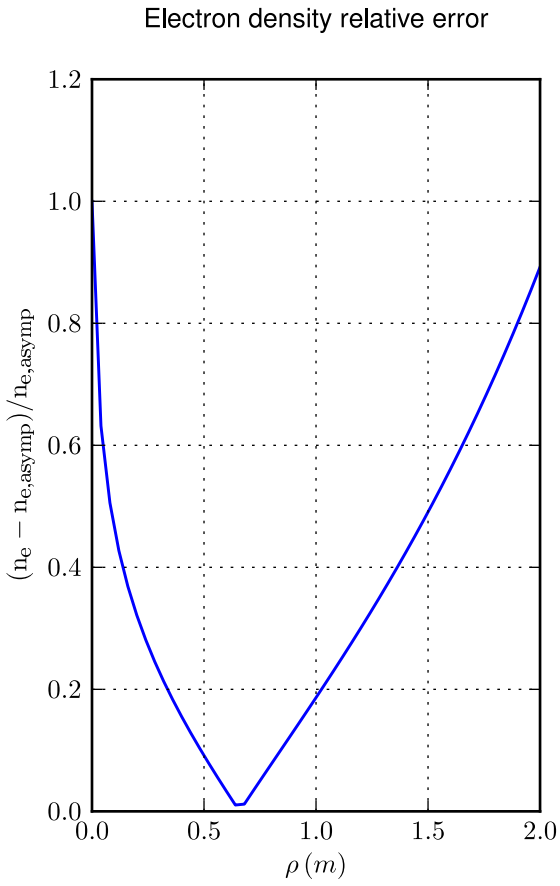
Time sampling: total simulation time/10



Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

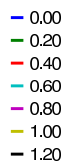
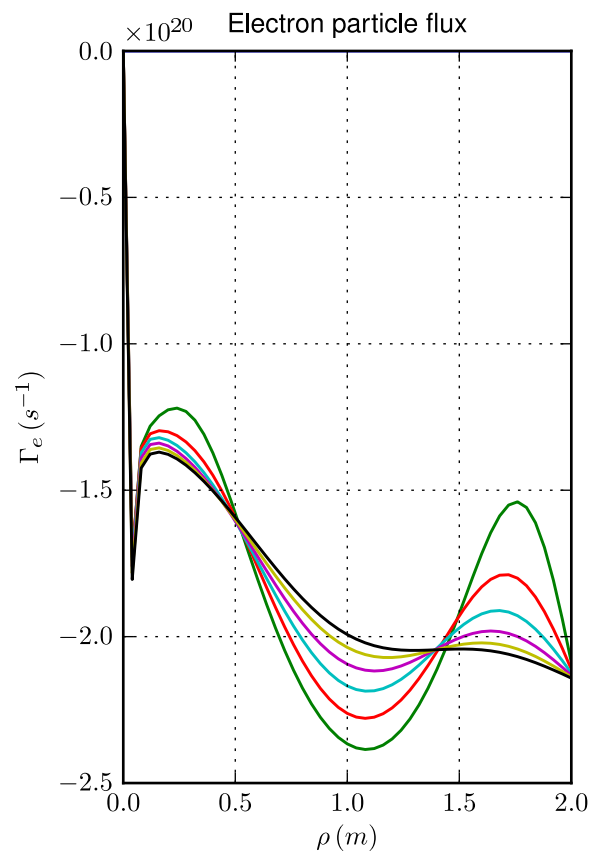
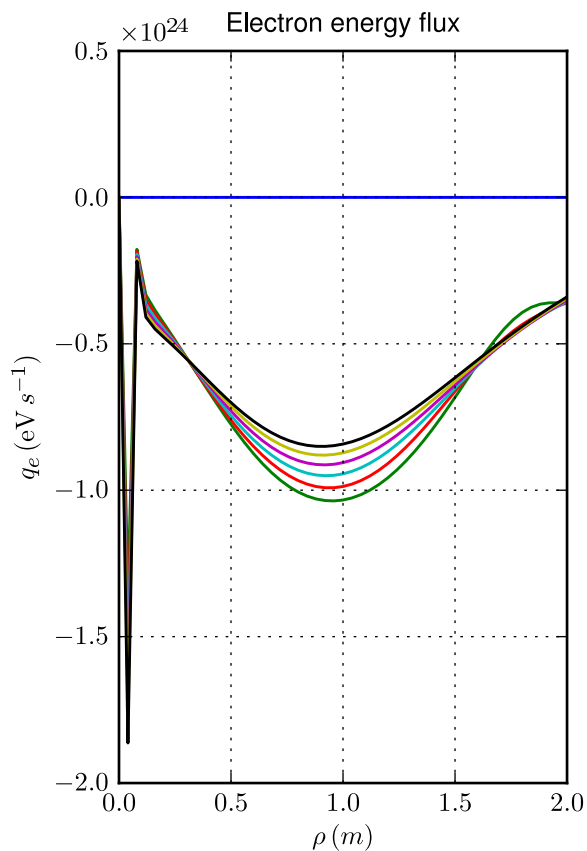
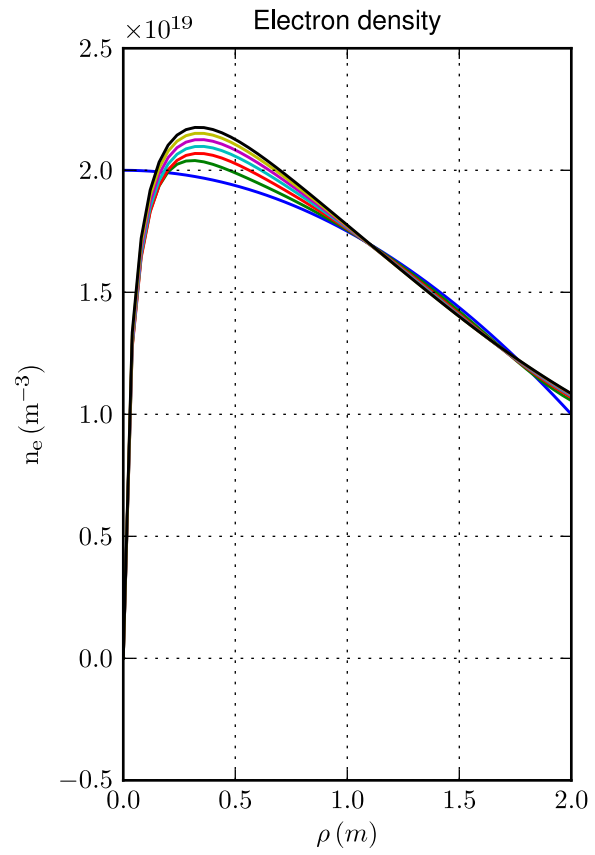
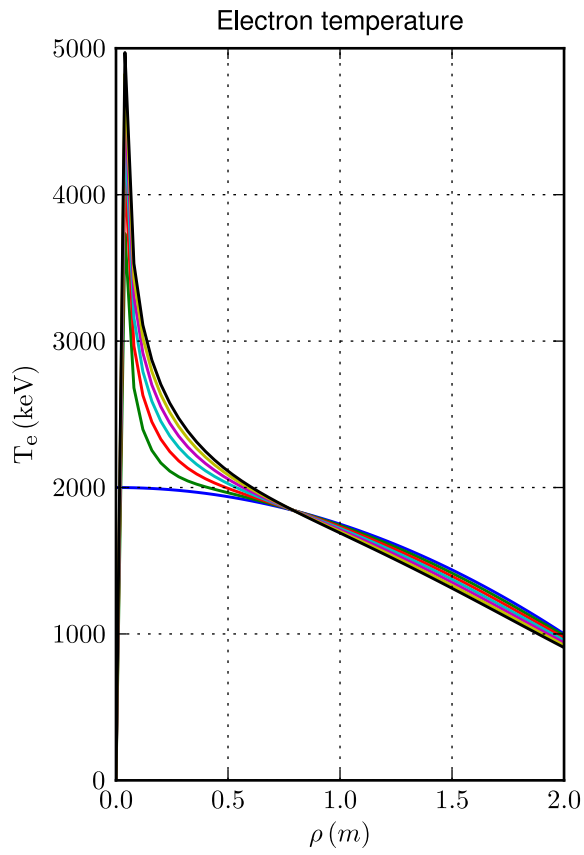
Comparison with asymptotic solution



Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$

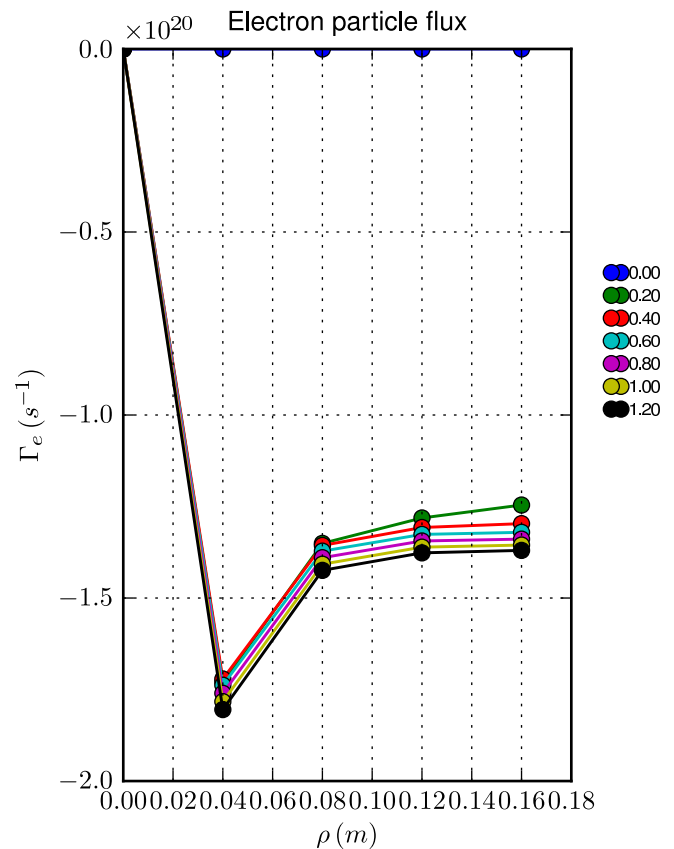
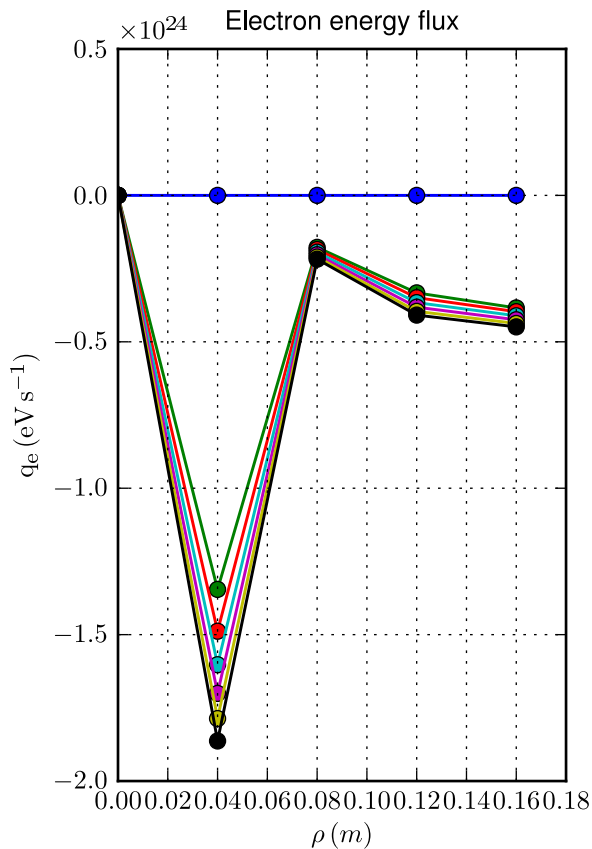
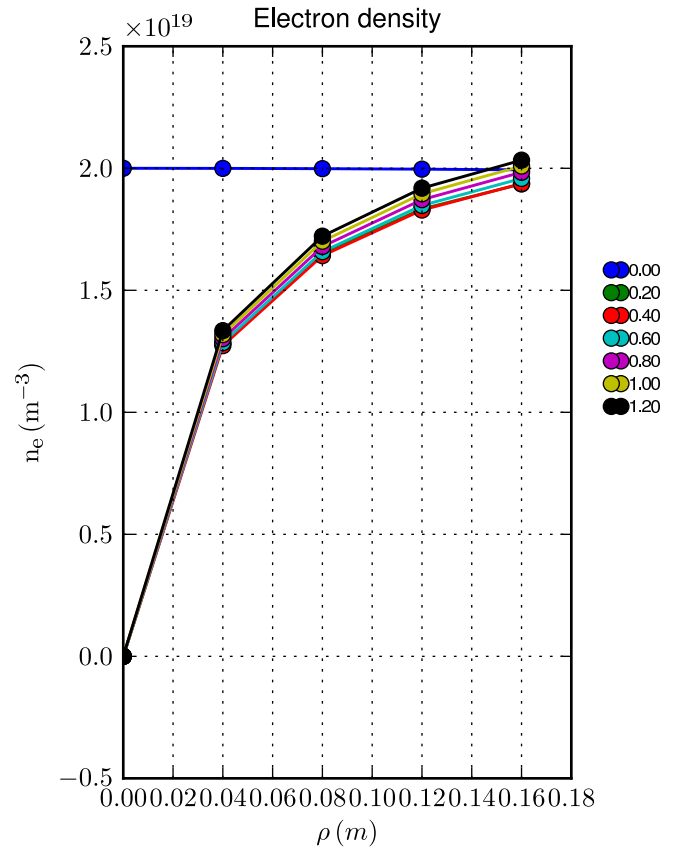
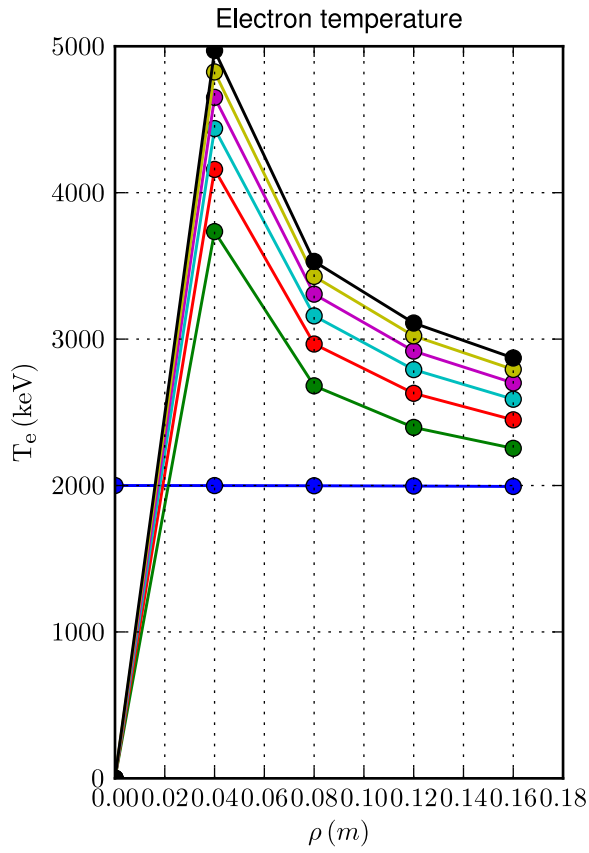


Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

Spatial zoom over magnetic axis

Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$

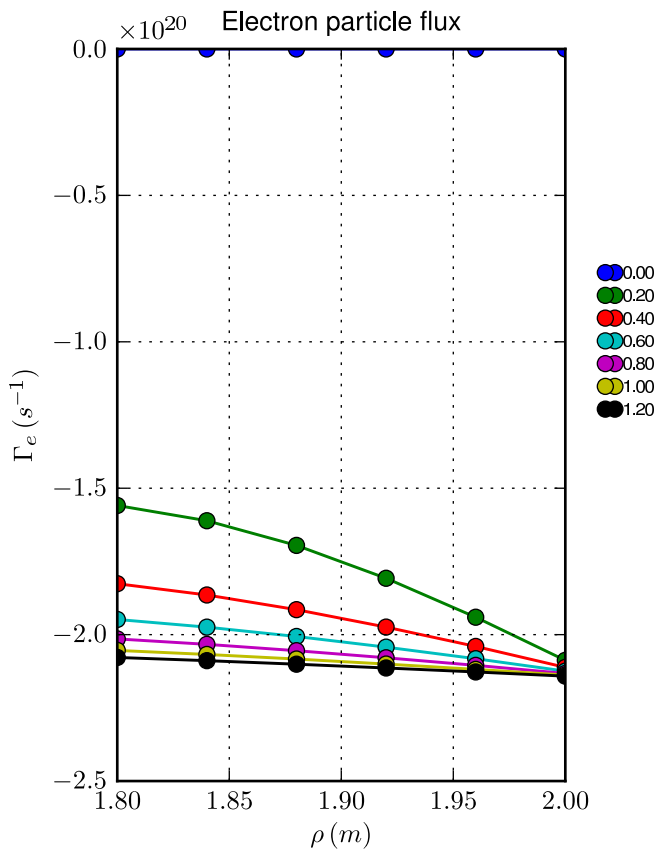
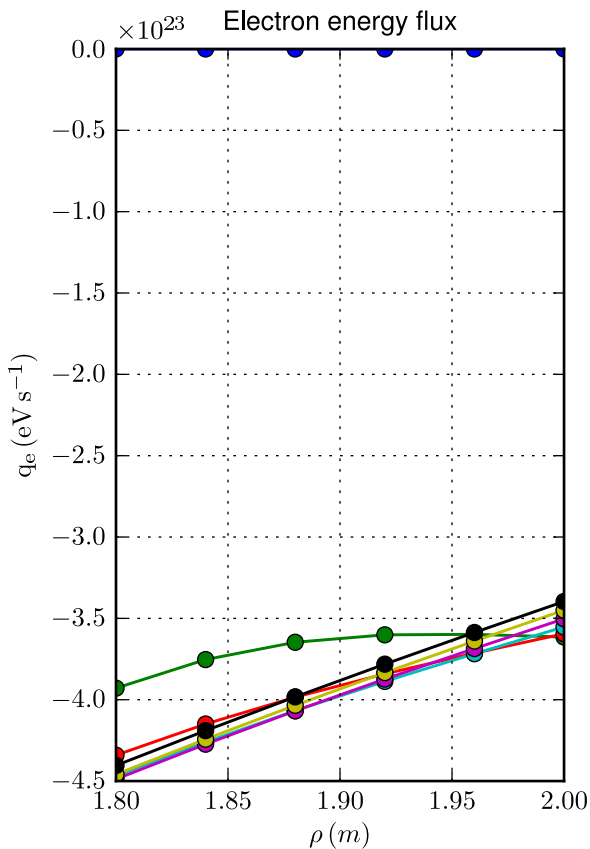
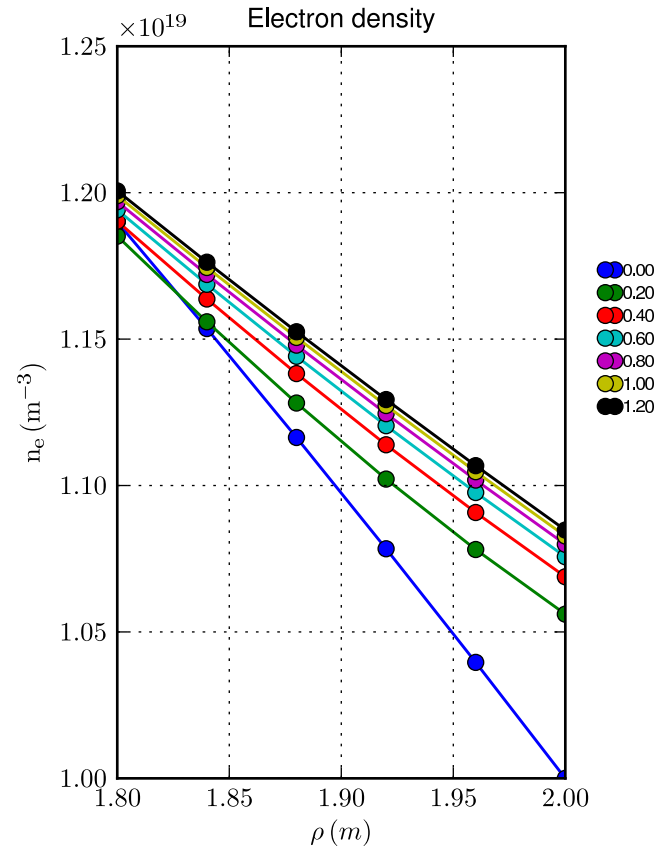
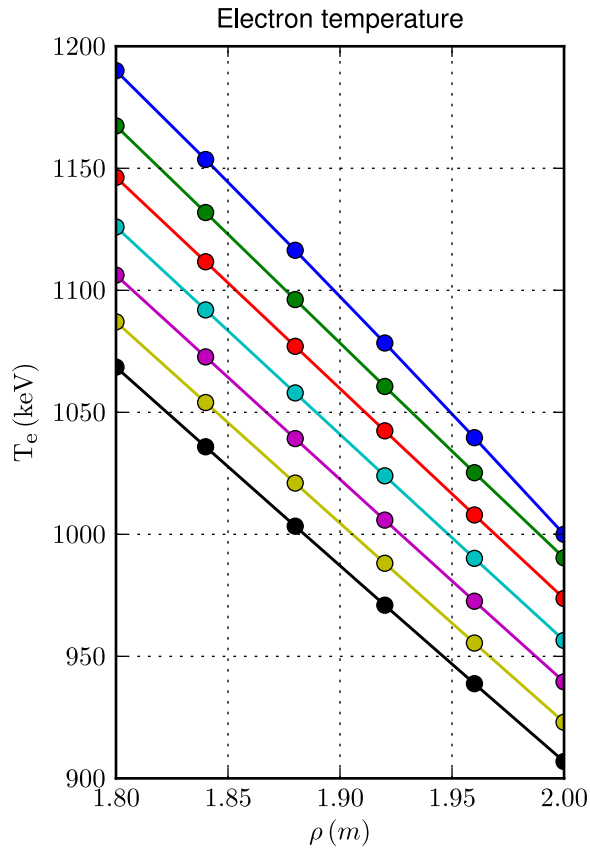


Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_p = 51$]

Spatial zoom over edge

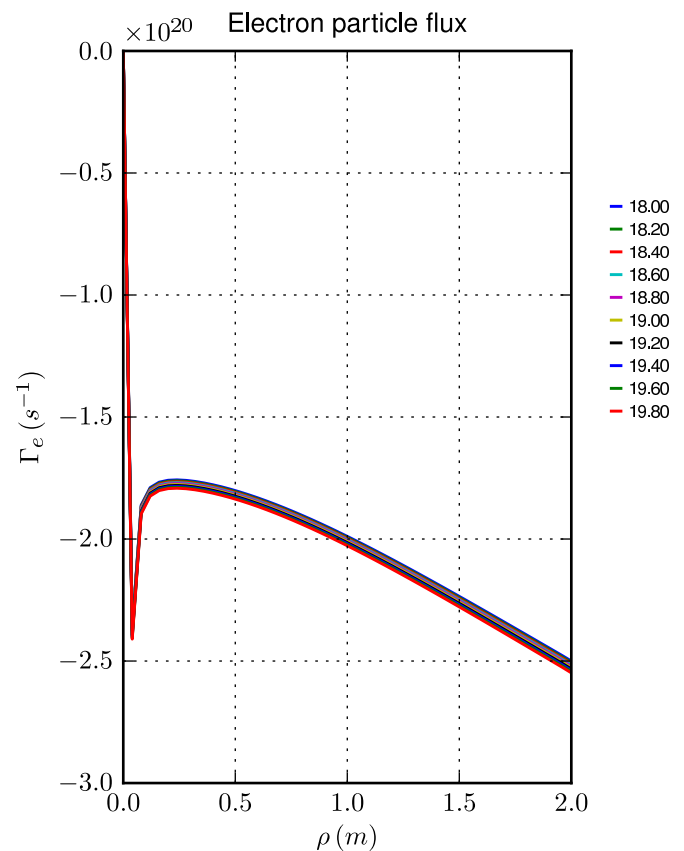
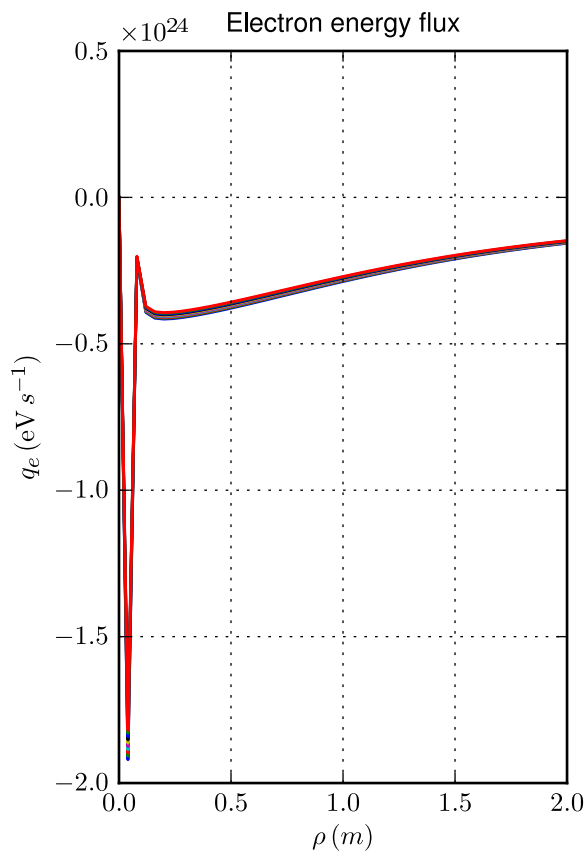
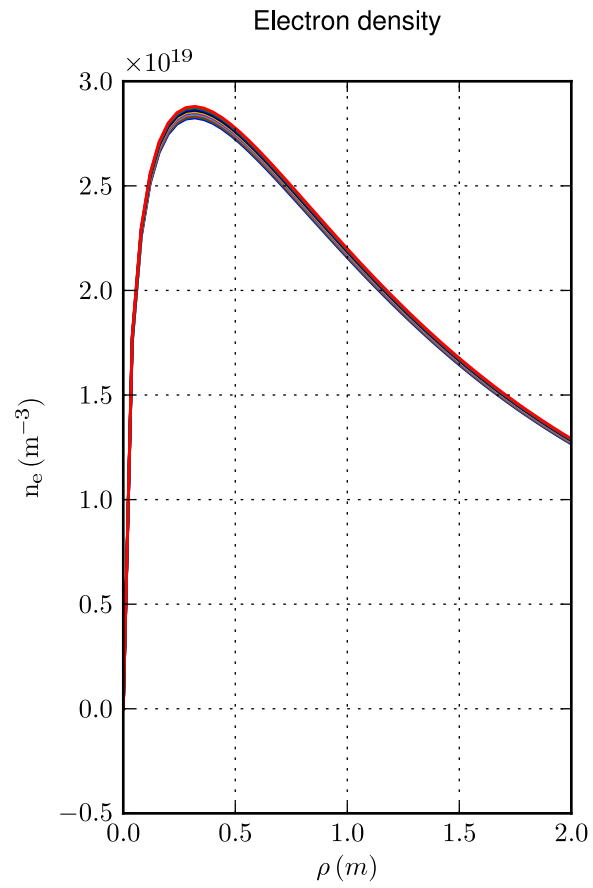
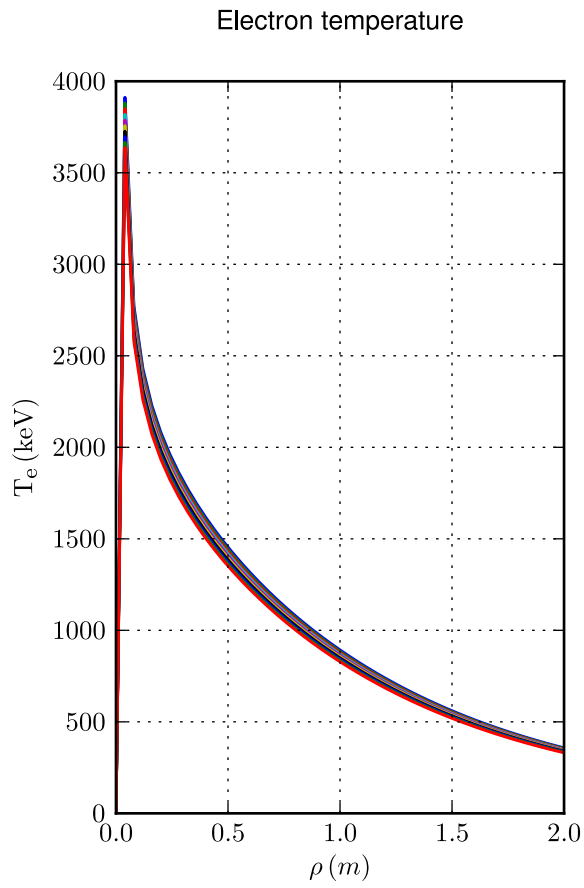
Time sampling: first 10 time slices or zoom over time $0.1 \times (a^2/D)/|1 - (Va/D)| = 1.33 \text{ s}$



Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

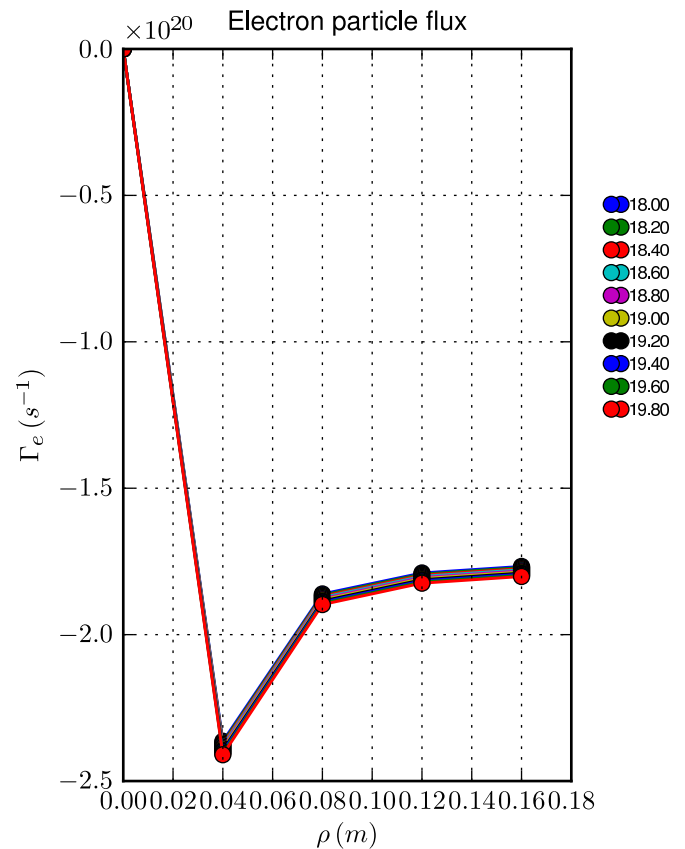
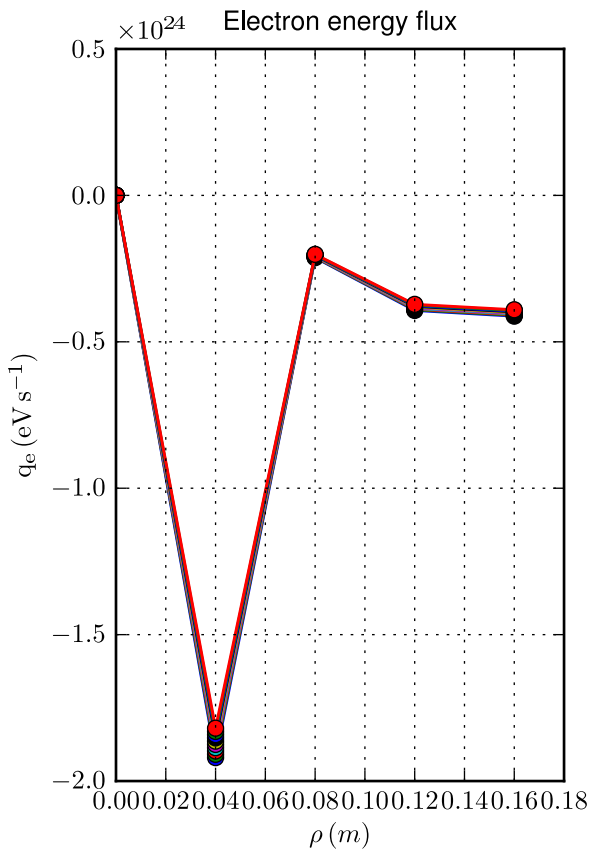
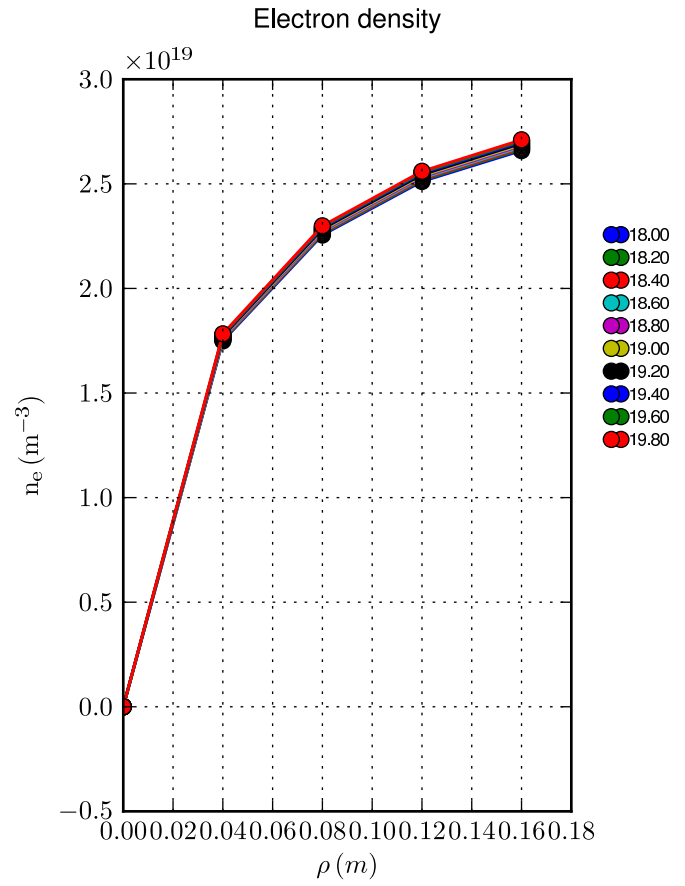
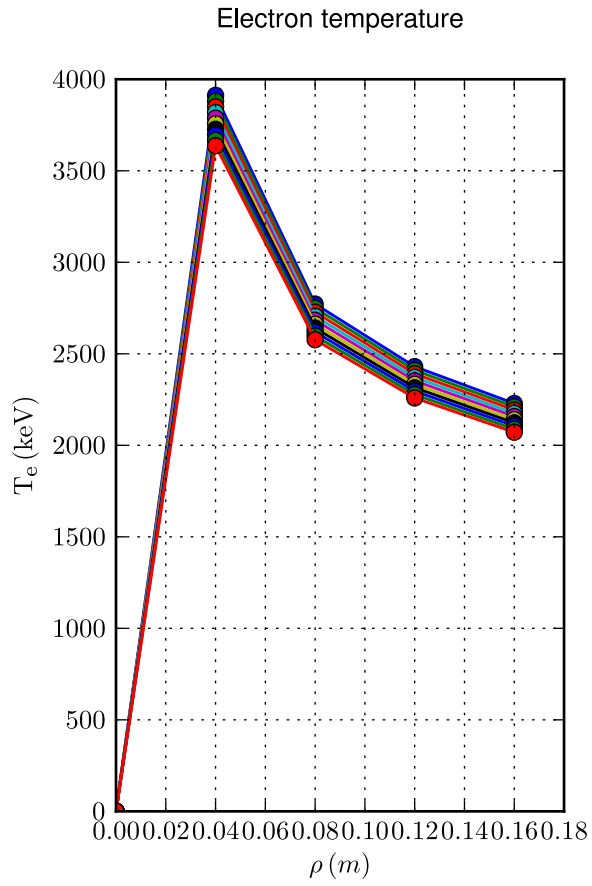
Time sampling: last 10 time slices



Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

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



Profiles

[Case: I.1.5.h, Solver: 10, $D = 0.1 \text{ m}^2/\text{s}$, $v = -0.10 \text{ m/s}$, $\Delta t = 20.00$, $\tau = 1.0 \times 10^{-3} \text{ s}$, $N_\rho = 51$]

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

