Electron behavior in Electrostatics (ES)

1. input2.plasma
Description:
Analysis of plasma waves, measuring frequency and wavelength in thermal equilibrium
ID = 10
Vary thermal velocity, number of particles/cell.
Reference:
Krall and Trivelpiece, Chapter 1 and 4
Significance:
Waves are a fundamental collective process in plasmas.

2. input2.2stream
Description:
Wave instability of two plasma streaming through one another.
ID = 12
Vary relative streaming velocities, examine the growth rates and saturation, compare growth to linear theory.
Reference: Krall and Trivelpiece, Chapter 2, 9
Significance
Fundamental plasma instability
Notes: time reverse?

3. input2.traj
Description
Analysis of trajectories of particles in thermal equilibirum.
ID = 13
Varying number of particles/cell. Measure ratio of potential/kinetic energies. Vary the random numbers used in velocity initialization
Reference:
Significance:
Trajectories have a random element, which depends on the number of particles/cell.
Plasma exhibit discreteness effects as well as collective behavior.

4. input2.drag
Study of redistribution particles within a stable velocity distribution in thermal equilibrium. Track particles with same initial velocity as a function of time.
ID = 14
Measure the mean velocity and velocity spread as a function of time.
Vary velocity group and number of particles
Reference: Ichimaru
Significance: Basic study of drag and diffusion effects in plasmas

5. input2.bont
Description:
Wave instability of small beam in background plasma.
ID = 17
Vary beam velocity, temperature, and number of particles. Compare growth with linear theory. Time Reversal
Reference: Krall and Trivelpiece, Chapter 1, 9
Significance:
Fundamental plasma instability often seen in laboratories and space, distribution with positive slope are unstable. Nonlinear saturation.

Ion Behavior in Electrostatics (ES)

6. input2.ions
Study of ion acoustic waves
ID = 16
Vary mass ratio and electron/ion temperature ratio
References: Krall and Trivelpiece, Chapter 1, 3 and 4
Significance:
Most fundamental ion wave in plasmas

Electron behavior in Electromagnetics (EM)

7.input2.light
Study of light waves in unmagnetized plasma in thermal equilibrium
ID = 20
Vary particle number
Reference: Krall and Trivelpiece, Chapter 1
Significance:
Most fundamental normal mode in unmagnetized electromagnetic plasmas

8. input2.LR
Analysis of electromagnetic waves in magnetized plasma with k parallel to B (Left and Right Circularly polarized and whistler modes). Compare dispersion relation with analytic theory.
ID = 22
Vary ratio of electron cyclotron frequency to plasma frequency
Reference: Krall and Trivelpiece, Chapter 4
Significance:
Fundamental high frequency normal mode in magnetized electromagnetic plasmas

9. input2.X
Analysis of electromagnetic waves in magnetized plasma with k perpendicular to B. (Ordinary and Extraordinary, and electron Bernstein modes). Compare dispersion relation with analytic theory.
ID = 23
Vary ratio of electron cyclotron frequency to plasma frequency
Reference: Krall and Trivelpiece, Chapter 4
Significance:
Fundamental high frequency normal mode in magnetized electromagnetic plasmas

Electron Behavior in Darwin (Darwin)

10. input2.dawin
Analysis of waves driven by plasma currents in magnetized plasma with k perpendicular to B (electron bernstein modes). Compare dispersion relation with analytic theory.

ID = 30
Vary ratio of electron cyclotron frequency to plasma frequency
Reference: Krall and Trivelpiece, Chapter 4
Significance:
Fundamental low frequency electron mode in magnetized plasmas with k perpendicular to B.

11. input2.whistler
Analysis of electromagnetic waves driven by plasma currents in magnetized plasma with k parallel to B (whistler modes). Compare dispersion relation with analytic theory.
ID = 31
Vary ratio of electron cyclotron frequency to plasma frequency
Reference: Krall and Trivelpiece, Chapter 4
Significance:
Fundamental low frequency electron mode in magnetized plasmas with k parallel to B