

Computational Lab Notebook

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1.1 Landau Damping Summary

Landau Damping is the effect of the waves losing their energy to particles in the plasma depending on the distribution function of the particles in the plasma. This effect is the result of two individual effects. The resonance of the particle with velocities close to the phase velocity of a wave will gain or lose energy to the wave. This effect is not at all similar to how a surf gains velocity from a wave as that is not how surfing works. The amount of energy lost or gained by the wave depends on whether there are more particles with a velocity slightly greater than that than the phase velocity of the wave or more with less. Therefore the energy lost by the wave is determined by the gradient of the velocity function of the particles around the phase velocity of the wave. Since in most thermal distributions this gradient is negative, the wave usually loses energy. Therefore this effect is called Landau damping.