

## Alfven Waves in a partially ionized two-fluid plasma

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### Abstract

We study Alfven waves in a partially ionized plasma from the theoretical point of view using the two-fluid description. We consider the plasma is composed of an ion–electron fluid and a neutral fluid, interacting by particle collisions. We take the neutral–ion collision frequency and the ionization degree as free parameters. First, we perform a normal mode analysis. We find the modification due to neutral–ion collisions of the wave frequencies and study the temporal and spatial attenuation of the waves. In addition, we discuss the presence of cutoff values of the wavelength that constrain the existence of oscillatory standing waves in weakly ionized plasmas. Later, we go beyond the normal mode approach and solve the initial-value problem in order to study the time-dependent evolution of the wave perturbations in the two fluids. An application to Alfven waves in the low solar atmospheric plasma is performed and the implication of partial ionization for the energy flux is discussed.