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The plasma mass transport process known as the interchange instability has been observed at Saturn, and is analogous to Rayleigh-Taylor instabilities such as Spread-F and Equatorial Plasma Bubbles seen in the Earth's Ionosphere. This instability has been detected with uneven signatures across different plasma instruments on Cassini, including the Radio and Plasma Science (RPWS) instrument, particle sensors (ions and electrons in MIMI and CAPS), and magnetometer (MAG). The interchange is thought to be significant in dynamically interfacing between the solar-wind driven plasma and internally sourced plasma in the Kronian magnetosphere.

We offer a unifying review of these interchange instabilities reported in past statistical surveys [Azari et al., 2018; Chen & Hill, 2008; Kennelly et al., 2013; Lai et al., 2016] by explaining events seen coincidentally with all of the plasma instruments, in comparison with those seen by a subset of instruments. In particular, we focus on the RPWS instrument to examine the different wave signatures characteristic of the interchange. This includes changes in the upper hybrid, chorus, electron cyclotron harmonics, and low frequency waves, which inform us on the stability of different temperature particle populations in the interchange instability, and their interactions with the surrounding environment.
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