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Reception of Microwave Signals through a Shear Flow with Lower Hybrid Turbulence[1] SABA MUDALIAR, Air Force Research Laboratory — A variety of instabilities is known to be generated in plasma flows with velocity shear. We consider the case when an external magnetic field is present orthogonal to the flow direction. The scale length of the velocity shear is assumed to be considerably larger than the electron gyro radius but much smaller than the ion gyro radius. Thus, the ions are unmagnetized while the electrons are magnetized. These conditions induce lower hybrid instabilities (LHI) in the flow. Our interest is to understand the impact of such LHI on the reception microwave signals propagating through the flow. A statistical analysis is carried out by decomposing the received signal into two parts: coherent and diffuse. We find that the coherent part has the same spectrum as that of the incident signal, but undergoes dispersive attenuation. The diffuse part is obtained as a convolution (in wavenumber and frequency) of the source signal with the spectrum of electron density fluctuations. We find that the mean free path is an important quantity for understanding the impact of the turbulent flow on the coherent and diffuse parts of the received signals. Detailed analysis is presented to investigate the physics of various scattering processes involved in this problem.

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Saba Mudaliar
Air Force Research Laboratory

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