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Two Fluid, Ten Moment Simulations of Temperature Anisotropy Driven Instabilities in the Solar Wind ETHAN BAIR, Cornell University, JASON TENBARGE, Princeton University, JAMES JUNO, University of Maryland, AMMAR HAKIM, Princeton Plasma Physics Laboratory — The solar wind is a stream of plasma that continuously flows from the sun and expands outward into the heliosphere. This expansion leads to anisotropy in pressure and temperature along and across magnetic fields lines that drive instabilities, such as the proton and electron firehose, mirror, and whistler instabilities. Here we explore these instabilities using the two fluid, ten moment model in the Gkeyll simulation framework. We attempt to expand upon hybrid fluid models that have been used to study these instabilities by retaining more dynamical information about the electrons, i.e., the full electron pressure tensor, while also exploring the limits of the ten-moment model to capture the physics of these kinetic instabilities. Using extended fluid models which capture these dynamically important instabilities provides a promising path forward for global modeling given the computational constraints inherent to kinetic modeling.

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