Abstract Submitted
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Multiscale Models for the Two-Stream Instability[1] ILON JOSEPH, ANDRIS DIMITS, Lawrence Livermore National Lab, JEFFREY BANKS, Rensselaer Polytechnic Institute, RICHARD BERGER, Lawrence Livermore National Lab, STEPHAN BRUNNER, Ecole Polytechnique Federale de Lausanne, THOMAS CHAPMAN, Lawrence Livermore National Lab — Interpenetrating streams of plasma found in many important scenarios in nature and in the laboratory can develop kinetic two-stream instabilities that exchange momentum and energy between the streams. A quasilinear model for the electrostatic two-stream instability is under development as a component of a multiscale model that couples fluid simulations to kinetic theory. Parameters of the model will be validated with comparison to full kinetic simulations using LOKI [1] and efficient strategies for numerical solution of the quasilinear model and for coupling to the fluid model will be discussed. Extending the kinetic models into the collisional regime requires an efficient treatment of the collision operator. Useful reductions of the collision operator relative to the full multi-species Landau-Fokker-Plank operator are being explored. These are further motivated both by careful consideration of the parameter orderings relevant to two-stream scenarios and by the particular 2D+2V phase space used in the LOKI code. [1] J. W. Banks and J. A. F. Hittinger, IEEE Trans. Plasma Sci. 38 (2010) 2198.

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