

Abstract Submitted
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Effects of Ion-ion Collisions and Inhomogeneity in Two-dimensional Simulations of Stimulated Brillouin Backscattering* B.I. COHEN, A.B. LANGDON, L. DIVOL, E.A. WILLIAMS, U.C. LLNL — Two-dimensional simulations of stimulated Brillouin backscattering (SBBS) with the BZOHAR¹ code have been extended to include ion-ion collisions and spatial nonuniformity in the mean ion flow. BZOHAR hybrid simulations (particle-in-cell kinetic ions and Boltzmann fluid electrons) have shown² that SBBS saturation is dominated by ion trapping effects and secondary instability of the primary ion wave (decay into subharmonic ion waves and ion quasi-modes). Here we address the effects of ion collisions³ on SBBS saturation and employ the efficient Langevin ion collision algorithm of Ref. 4 and the Fokker-Planck collision operator of Ref. 5. We also report simulations of SBBS with a linear gradient in the mean ion drift, which in conjunction with the nonlinear frequency shift due to ion trapping can introduce auto-resonance effects that may enhance reflectivities.⁶ For SBBS in a high-gain limit with ion collisions or inhomogeneity, we find that ion trapping and secondary ion wave instabilities are robust saturation mechanisms. *Work performed for US DOE by UC LLNL under Contr. W-7405-ENG-48. ¹B.I. Cohen, *et al.*, Phys. Plasmas **4**, 956 (1997). ²B.I. Cohen, *et al.*, Phys. Plasmas, **12**, 052703 (2005). ³P.W. Rambo, *et al.*, Phys. Rev. Lett. **79**, 83 (1997). ⁴M.E. Jones, *et al.*, J. Comp. Phys. **123**, 169, (1996). ⁵W. M. Manheimer, *et al.*, J. Comp. Phys. **138**, 563 (1997). ⁶E.A. Williams, *et al.*, Phys. Plasmas **11**, 231 (2004).

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