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Models of the SRS-SBS coupling for NIF[1] E.S. DODD, D.F. DUBOIS, B. BEZZERIDES, LANL, H.X. VU, U. C., San Diego — For about 20 years experimental and theoretical evidence has accumulated showing the anti-correlation of SRS and SBS backscatter reflectivity levels. Using reduced particle-in-cell (RPIC) methods, we study these instabilities in regimes where the temporal behavior is characterized by bursts of SRS and SBS reflectivity due to electron and ion trapping in the daughter electrostatic waves-Langmuir waves (LW) and ion acoustic waves (IAW), respectively. SRS is observed to die as soon as SBS begins to grow from low levels. The temporal envelope of the SRS LW obeys a Schrodinger equation where, for this problem, the potentialis the periodic electron density fluctuation, n_{IAW}, resulting from the SBS IAW. The LW in this case have a Bloch wave structure with a distorted frequency dispersion, including frequency band gaps at k_{LW} $k_{IAW}/2$ k_l. This band structure is observed in RPIC ω, k spectra of the LWs, which is functionally equivalent to experimental Thomson scatter spectra. The frequency distortion increases as n_{IAW} increases in time, resulting in a time dependent frequency shift of the LW that detunes SRS. Simulations in laser and plasma parameter regimes typical of NIF targets and for Trident single hot spot experiments show similar behavior. This work can lead to a model of the SRS-SBS coupling for macroscopic simulations such as pF3d.

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