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Saturation of Stimulated Raman Scatter in laser speckle by Langmuir wave self-localization HARVEY ROSE, L. YIN, LANL — Since the trapped electron Langmuir wave (LW) frequency shift, $\delta\omega < 0$ exceeds [1] the frequency shift due to ponderomotive expulsion of plasma density for LW wavenumber $k\lambda_D > 0.2$, self-localization effects induced by trapped electrons are dominant for short times in hot, under dense, plasma. For SRS originating in laser speckles, with daughter LW wavenumber in an intermediate wavenumber regime, k=0.35, we show from both 2D PIC simulations and reduced model calculations that $\delta\omega$ leads to LW phase front bowing whose curvature increases with wave amplitude, ϕ, and time. Once the bow radius of curvature is smaller than a speckle width, the SRS source oscillates in sign across the speckle, causing SRS saturation. This process is neither unstable nor strongly dissipative: results show reduction of SRS even while LW energy grows. However, as ϕ continues to grow and the trapped electron LW self-focusing threshold exceeded, the LW breaks into filaments [2], causing enhanced rate of loss of trapped electrons and associated increase of Landau damping, followed by rapid demise of the SRS pulse.

[1] Harvey A. Rose, Physics of Plasmas **12**, 012318 (2005)
[2] L. Yin, et al., Physics of Plasmas 13, 072701, (2006).

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