Abstract Submitted
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Radiative heat transport instability in ICF plasmas W. ROZMUS, Department of Physics, University of Alberta, Edmonton T6G 2E1, Alberta, Canada, V. YU. BYCHENKOV, P. N. Lebedev Physics Institute, Russian Academy of Sciences, Moscow 119991, Russia — A laser produced high-Z plasma in which an energy balance is achieved due to radiation losses and radiative heat transfer supports ion acoustic wave instability [1]. A linear dispersion relation is derived and instability is compared to the radiation cooling instability [2]. This instability develops in the wide range of angles and wavenumbers with the typical growth rate on the order of cs/LT (cs is the sound speed, LT is the temperature scale length). In addition to radiation dominated systems, a similar thermal transport driven ion acoustic instability was found before in plasmas where the thermal transport coefficient depends on electron density. However, under conditions of indirect drive ICF experiments the driving term for the instability is the radiative heat flux and in particular, the density dependence of the radiative heat conductivity. A specific example of thermal Bremsstrahlung radiation source has been considered corresponding to a thermal conductivity coefficient that is inversely proportional to the square of local particle density. In the nonlinear regime this instability may lead to plasma jet formation and anisotropic x-ray generation.

[1] V. Yu. Bychenkov and W. Rozmus, Phys. Plasmas 22, (2015).
[2] R. G. Evans, Plasma Phys. Contr. Fusion 27, 751 (1985).

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