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Modelling of heat flux driven return current instability and ion acoustic turbulence WOJCIECH ROZMUS, Univ of Alberta, M. SHERLOCK, Lawrence Livermore National Laboratory, Livermore, California 94551, USA, A.V. BRANTOV, V. YU. BYCHENKOV, P. N. Lebedev Physics Institute, RAS, Moscow 119991, Russia — Hot plasmas with strong temperature gradients in inertial confinement fusion (ICF) experiments are examined for ion acoustic instabilities produced by electron heat flux. Return current instability (RCI) due to neutralizing current of cold electrons arising in response to large electron heat flux has been considered. First linear threshold and growth rates are derived in the nonlocal regime of the thermal transport. They are compared with results of Vlasov-Fokker-Planck (VFP) simulations in one spatial dimensions. Very good agreement has been found between kinetic VFP simulations and linear theory of the RCI. Quasi stationary state of ion acoustic turbulence produced by the RCI is achieved in VFP simulations. A saturation of the RCI involves heating of ions in the tail of the ion distribution function, convection of the enhanced ion acoustic fluctuations from the unstable region of the plasma and anomalous electron resistivity. Further evolution of the ion acoustic turbulence and its effects on the absorption and transport are also discussed.

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