Online LTP Seminar
July 6, 2021
9 am EDT

Ionization Oscillations and Breathing Modes in EXB Plasmas

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The axial instability in Hall thruster channel associated with self-consistent fluctuations of the electric field and ionization, commonly known as a breathing mode, and accompanied by strong oscillations of the discharge current, is one of the most violent instability in Hall thrusters. In this talk, we review physical mechanisms for the instability and discuss the modification of the predator-prey model that predicts the conditions for the instability and its characteristics based on coupling of neutral and ion densities. The predictions of the reduced model are compared with results of the full model that includes self-consistent dynamics of ions, electrons, and neutrals, as well as the evolution of the electron energy.

Short Bio

Andrei Smolyakov is a Professor in the Department of Physics and Engineering Physics at the University of Saskatchewan, Canada. He received his MSc. (Diploma of Engineer-Physicist) and Ph.D. (Candidate of Physical and Mathematical Sciences) degrees in 1983 and 1986, respectively, both from Moscow Institute of Physics and Technology, Russia. His research interests include basic plasma physics with applications to magnetic fusion, laboratory plasmas, and plasma for electric propulsion. He is a Fellow of American Physical Society, Senior Member of the Institute of Electrical and Electronics Engineers, and a Professional Engineer registered in the Province of Saskatchewan. He is a member of the editorial boards for several plasma physics journals and is an Associate Editor for Physics of Plasmas of AIP.