Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

**Driving Low Frequency Oscillations in Hall Thrusters.**[1] YEVGENY RAITSES, JACOB SIMMONDS, Princeton Plasma Physics Laboratory, OLEKSANDR CHAPURIN, ANDREI SMOLYAKOV, University of Saskatchewan, IGOR KAGANOVICH, Princeton Plasma Physics Laboratory — Hall thruster technology has become the most mature in the field of spacecraft propulsion, however, its performance capabilities are still far from its technological and fundamental limits. Further performance improvements may require new designs and operating regimes. One such potential reserve for improvements may be in controlling inherent low-frequency (10-30 kHz) oscillatory modes, so-called breathing mode and spoke mode, which are often observed in Hall thrusters [1]. The breathing mode is the axial mode that propagates in the direction of the external electric field, is the most powerful mode observed in Hall thrusters, revealing itself in oscillations of the discharge current, often reaching amplitudes comparable to the mean discharge current itself. The spoke mode manifests itself as strong perturbations in plasma density that propagate in the azimuthal ExB direction, generating substantial components in electric field in this direction. In this work, we demonstrate that both breathing and spoke modes can be amplified or suppressed depending on the amplitude and frequency of the anode voltage modulation. We compare and analyze the effect of modulations on plasma and thruster performance measured in experiments and obtained from simulations.

[1]This work was supported by the Air Force Office of Scientific Research

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Date submitted: 02 Jul 2019 Electronic form version 1.4