Contribution ID: **592** Type: **Poster**

Strong Electron Emission Could Enable a New Plasma-Surface Interaction Regime in Divertors

Thursday, 20 October 2016 14:00 (4h 45m)

Electron emission from surfaces is important in many plasma applications. Recently, it was shown that a fundamentally distinct plasma-surface interaction regime denoted the "inverse regime"[1] occurs when the emission coefficient exceeds unity. An inverse regime might arise in divertors because secondary and thermionic emission from divertor plates are intense under certain operating conditions. Two characteristics of the inverse regime could offer compelling benefits. First, the sheath potential is positive, so the ions do not accelerate towards the wall. By comparison, ions gain an extra ˜3 to 5Te of energy in the conventional regime by acceleration in the Bohm presheath and negative sheath potential. A dramatic reduction of physical sputtering is therefore expected in the inverse regime. Secondly, in the inverse regime, an intense cloud of cold (<1eV) electrons dominates the quasineutral presheath region near the plasma edge. The cold electron cloud could thereby significantly cool the near-wall plasma, helping to achieve detachment conditions. Further analysis is needed to determine whether an inverse regime is really possible in a SOL and whether it would be beneficial or not.

[1] M. D. Campanell and M. V. Umansky, Physical Review Letters 116, 085003 (2016).

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344.

Paper Number

TH/P6-28

Country or International Organization

USA

Primary author: Dr CAMPANELL, Michael (Lawrence Livermore National Laboratory)

Co-author: Dr UMANSKY, Maxim (Lawrence Livermore National Lab)

Presenter: Dr CAMPANELL, Michael (Lawrence Livermore National Laboratory)

Session Classification: Poster 6

Track Classification: THD - Magnetic Confinement Theory and Modelling: Plasma–material interactions; divertors, limiters, SOL