Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Plasma oscillations in impurity seeded divertor R.D. SMIRNOV, UCSD, A.S. KUKUSHKIN, NRC "Kurchatov Institute," MEPhI, Russia, S.I. KRASHENINNIKOV, A.YU. PIGAROV, UCSD, T.D. ROGNLIEN, LLNL — Seeding of divertor plasma with impurities is considered as a method of mitigation of high heat fluxes to divertor targets. In this work we report on self-sustained divertor plasma oscillations induced by seeding with high- and low-Z impurities. The oscillations are demonstrated using modeling with DUSTT/UEDGE and SOLPS4.3 codes of ITER-like divertor plasmas seeded with tungsten or nitrogen impurities. The simulated plasma oscillations for the high- and low-Z impurity seeding cases are characterized by significantly different plasma and impurity dynamics. Correspondingly, two oscillation generation mechanisms of radiation-condensation type are proposed, which are characterized by: i) parallel transport of high-Z impurity ions due to plasma thermal force in SOL, and ii) cross-field transport of low-Z impurity neutrals due to radial pressure gradient in the vicinity of the divertor plates. The both mechanisms are associated with macroscopic plasma-impurity dynamics, which differs the oscillations from intermittent plasma turbulence events. The implications of the plasma oscillations on divertor operation in ITER scale tokamaks, in particular on target plate heat load, are discussed.

R.D. Smirnov
UCSD

Date submitted: 23 Jul 2015 Electronic form version 1.4