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POS-B6 – Impurity transport modelling in a magnetron discharge

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Recently, it was observed that under high pressure (p > 10Pa), nanoparticles could be created using sputtering magnetron discharges. Although this device has been widely studied at low gas pressure (p < 0.1Pa) for its industrial application such as thin film coating, there is no plasma model at the fairly high pressure range. The study of physical mechanism driving the transport of these nanoparticles can, for example, give insights on tokamak impurity and dust agglomeration problem.

Experimental studies are in progress at PIIM laboratory in Marseille where magnetically confined plasmas are generated using argon sputtering magnetron discharge with a tungsten cathode (p = 30Pa) [1, 2].

In that context, we propose to develop a reliable numerical model in order to investigate the transport of sputtered tungsten atoms in the discharge as done experimentally at PIIM laboratory. Usually, cold plasma discharges are simulated using PIC-MC or kinetic models [3-5], but we would like to present here the 2D axisymmetric fluid model. We refer to the work of C.Costin [6] which is a low pressure (< 4Pa) 2D magnetron fluid model on a similar geometry setup, extending it to high pressure case including the sputtered tungsten particles in the device. Some results (plasma potential, density profiles of different species⋯) from the first numerical simulations allowing to validate the model and the code are displayed.

References
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