Contribution ID: **48** Type: **not specified**

Atomic data needs for tungsten erosion, migration and deposition modelling in fusion devices

Wednesday, 31 March 2021 12:45 (30 minutes)

Tungsten is foreseen as plasma-facing material for future fusion devices like ITER and DEMO due to its high melting point and low sputtering. However, as high-Z material the tungsten concentration in the core plasma has to be limited to very low numbers to avoid plasma cooling and dilution. Thus, it is of extreme importance to minimise the tungsten net erosion sources as far as possible for which an extensive understanding of the involved physical processes is indispensable. Experiments in combination with modelling are required to achieve that aim.
The present contribution provides examples of ERO and ERO2.0 [1, 2] modelling of tungsten erosion, migration and resulting deposition for various fusion devices like TEXTOR, the linear device PSI-2 and JET-ILW. The eroded tungsten is observed in-situ by means of spectroscopy in the plasma, which is compared with the modelling. For that purpose, the modelling has to make use of atomic data for ionisation and excitation. The gross erosion source is typically estimated from the emission of tungsten atoms, whereas the emission of ionised species can be used to draw conclusions about the net erosion, i.e. considering the re-deposition of eroded tungsten particles. On the basis of the various modelling examples, the use of different available ionisation and excitation data, the importance of physical processes like metastable states or the excitation state of eroded tungsten will be discussed. The possible lack of atomic data and further data needs will be addressed.

[1] A. Kirschner et al., Nucl. Fusion 40 (2000) 989
[2] J. Romazanov et al., Phys. Scr. T170 (2017) 014018

Primary author: KIRSCHNER, Andreas (Forschungszentrum Juelich GmbH)

Co-authors: BREZINSEK, Sebastijan (Forschungszentrum Jülich); ROMAZANOV, Juri (Forschungszentrum Jülich GmbH); ERTMER, Stephan

Presenter: KIRSCHNER, Andreas (Forschungszentrum Juelich GmbH)

Session Classification: MOD/1 fusion devices