Contribution ID: **163** Type: **not specified**

Analyses of the influence of the recycling coefficient on He confinement in DEMO reactor

Monday, 17 September 2018 11:00 (2 hours)

Helium, as the ash of burning D-T plasma, is an unavoidable impurity component in DEMO reactor . Its efficient removal from the burning zone of a D-T fusion reactor is most important in the path towards achievement of economic fusion power production. Edge plasma transport properties: recycling/pumping will play a key role in the problem of helium removal from reactor.
This work describes integrated numerical modelling applied to DEMO discharges with tungsten wall and divertor, using the COREDIV code, which self-consistently solves 1D radial transport equations of plasma and impurities in the core region and 2D multi-fluid transport in the SOL. The model is self-consistent with respect to both the effects of impurities on the α-power level and the interaction between seeded (Ar) and intrinsic impurities (tungsten, helium). The coupling between the core and the SOL is made by imposing continuity of energy and particle fluxes as well as of particle densities and temperatures at the separatrix. In order to keep the prescribed plasma density at the separatrix, the deuterium recycling coefficient was iterated accordingly. It should be underlined that the recycling coefficient in our approach includes effects related to the pumping efficiency (albedo) as well as the intensity of the puffing.
The aim of the this work is to analyze the influence of the helium and hydrogen recycling on the He confinement in DEMO reactor. Simulation have been done for two argon seeding puff levels : moderate and strong. It is found that recycling coefficient of helium have strong influence on the He confinement, which increases from 8.5s to 16s (going from lowest to highest recycling coefficient), but it has small influence on the effective charge state and radiation in SOL. Alpha power decreases only by about 10%, which is the effect of main plasma dilution.

Co-authors: IVANOVA STANIK, Irena (Institute of Plasma Physics and Laser Microfusion); Dr PORADZINSKI, Michal (Institute of Plasma Physics and Laser Microfusion); Dr ZAGORSKI, Roman (Institute of Plasma Physics and Laser Microfusion); Dr SICCINIO, Mattia (Garching, Germany)

Presenter: IVANOVA STANIK, Irena (Institute of Plasma Physics and Laser Microfusion)

Session Classification: P1

Track Classification: Plasma Facing Components