Contribution ID: **32** Type: **Oral (Short)**

One-Dimensional Modelling and Experimental Validation of Divertor Detachment on HL-3 and HL-2A

Wednesday 10 September 2025 15:30 (45 minutes)

A new self-consistent 1D scrape-off layer model is recently developed in BOUT++ framework, named SD1D, which includes transport equations of various particle species (e.g. main plasma, neutrals and impurities) and couples collisional and radiative reactions by using open databases like ADAS and AMJUEL. In this work, SD1D is used to model divertor detachment experiments on two tokamak devices, HL-2A and HL-3. It is found that the variation of target electron temperature and the target ion current in simulations are consistent with experimental results on HL-2A and HL-3. The variation of divertor Dα radiation intensity in the modelling is qualitatively similar to the measured Dα signal, which is crucial for understanding the effects of plasma-neutral interactions on divertor detachment. The validation demonstrates that SD1D is capable of rapidly and effectively simulating divertor detachment experiments across various machines.
This work identifies a potential strategy for divertor impurity control on HL-3: increasing the upstream density enhances parallel transport, driving impurities (both intrinsic and extrinsic) toward the target plate. It may be helpful for control of the neon radiation front during detachment (closer to the target).

Speaker's email address

zhouyl@swip.ac.cn

Speaker's Affiliation

Southwestern Institute of Physics

Member State or International Organizations

China

Author: ZHOU, Yulin

Co-author: XU, Xinliang

Presenter: ZHOU, Yulin

Session Classification: Poster session with tea

Track Classification: Uncertainty Propagation, Verification and Validation