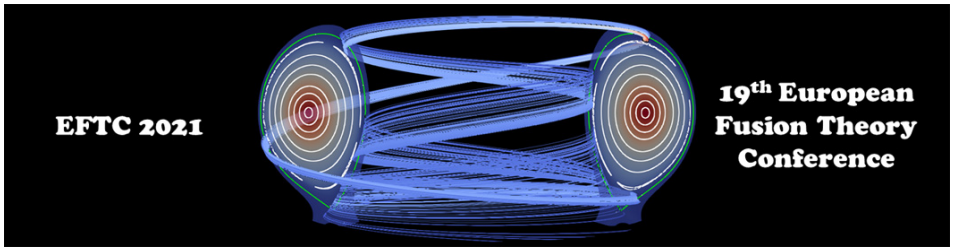

Contribution ID: **48** Type: **Poster**

Kinetic modelling of parallel transport in the tokamak scrape-off layer

Tuesday, 12 October 2021 14:50 (1h 50m)

The transport of particles and energy from the core plasma in a divertor tokamak to the reactor walls, via the scrape-off layer (SOL), occurs largely parallel to the magnetic field lines. Experimental evidence and theoretical considerations suggest that a fluid approach to modelling this transport may miss some important behaviour. In particular, temperatures at the target may be modified by nonlocal heat flow, and reaction rates with atomic and molecular species may be influenced by strongly non-Maxwellian electron distributions. Both of these effects are closely related to the onset of detachment. Here, an approach to kinetic modelling of parallel transport using the code SOL-KiT will be presented, which features fully kinetic electrons as well as a self-consistent fluid model for comparison. Extensions to the SOL-KiT model will also be discussed, including a quasi-2D fluid model for hydrogenic neutrals and allowing for independent ion and electron temperatures. Results will be presented of comparisons between fluid and kinetic simulations, showing modifications to temperature gradients, plasma-neutral reaction rates and electron-ion energy transfer.

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Session Classification: POSTER SESSION

Track Classification: 7. Edge and scrape-off layer/divertor physics