

# Scrape-off layer simulations in a Double Null magnetic configuration

*Carrie Beadle, Paolo Ricci and Paola Paruta*

Different magnetic geometries are being considered for handling the power exhaust in DEMO, among which is the double-null. In addition to doubling the exhaust area, experiments have found stark differences in the SOL on the HFS and LFS in this configuration[1], allowing the possibility of efficient heating from the HFS in addition to doubling the exhaust area. The contrast between the LFS and HFS calls for theoretical investigation. In fact, the asymmetry can help to disentangle the different driving mechanisms of the turbulence.

Since the temperature in the SOL is relatively low, the plasma is sufficiently collisional for a fluid model, such as the drift-reduced Braginskii, to be used. This model has been implemented in the GBS code[2],[3]. Recently, a non-field aligned coordinate system has been implemented in GBS. This avoids the coordinate singularity present for field-aligned coordinates at the X-point, thus allowing any toroidally symmetric magnetic field configuration to be simulated.

We will introduce GBS, discuss the implementation of the new coordinate system and show results of the first simulations in a double-null magnetic configuration. We will present insights on the equilibrium form of the electrical potential and pressure and on the nature of SOL turbulence.

## References :

- 1] B. LaBombard, et al. Nuclear Fusion 55, 052020 [2015]
- [2] P. Ricci, et al, Plasma Physics and Controlled Fusion 54, 112103 [2012]
- [3] F. Halpern, et al, Journal of Computational Physics 315, 388 [2016]