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Global two-fluid simulation of tokamak Scrape-Off-Layer turbulence ANNAMARIA MOSETTO, FEDERICO DAVID HALPERN, SEBASTIEN JOLLIET, PAOLO RICCI, Ecole Polytechnique Federale de Lausanne (EPFL), Centre de Recherches en Physique des Plasmas (CRPP), Lausanne, Switzerland — We present non-linear self-consistent 3D global fluid simulations of the SOL plasma dynamics using the Global Braginskii Solver (GBS) code. The code solves the drift-reduced Braginkii equations in a collisional plasma, with cold ions. The GBS code, originally developed for an electrostatic, 2D configuration has been recently upgraded to describe the SOL turbulence with the introduction of the variable curvature along the magnetic field lines, the magnetic shear, and the electromagnetic effects. The code peculiarity lies in the capability of evolving self-consistently equilibrium and 3D fluctuations as a results of the interplay among the sources, the turbulent transport and the plasma losses at the limiter plates. The non-linear simulations have been interpreted by means of linear analysis of the fluid equations modeling the system. This points out the presence of two main instabilities driving turbulence: the Drift Wave and the Resistive Balloning instabilities. The dependence of the instabilities growth rate and of their properties on the physical parameters of the system, for example the characteristic length of the plasma density, the magnetic shear and the β ratio have been explained and the regions where each instability dominates have been identified.

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