Momentum transport in the edge and into the SOL

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The transfer of momentum is studied at the transition from EDGE to SOL in magnetically confined toroidal plasmas using the 2D global code ESEL. The density and temperature profiles from the simulations are in fair agreement with experiment. The transfer of poloidal momentum is measured directly from the code, while the transfer of parallel momentum is inferred from the local overpressure associated with blobs propagating into the SOL. The results are qualitatively compared to probe measurements in the JET SOL. Specifically it is found that the parallel Reynolds-stress is maximal in the region where coherent blobs are observed to form, and consequently the overall profile of the experimentally inferred B grad B independent part of the SOL flow is well reproduced by the simulations.

Additionally, the transport of momentum in the edge is investigated by means of the 3D TYR code describing drift-Alfvén dynamics in a flux-tube geometry. Different physical mechanisms for the momentum transfer namely Maxwell-stress, geodesic transfer and Reynolds-stress are identified, quantified separately and compared to other transport channels.

[*] *see the Appendix of M. Watkins et al., Fusion Energy 2006 (Proc. 21th Int. Conf. Chengdu, 2006) IAEA, Vienna (2006).*