

Toroidal momentum transport equation for transport codes and consistency with a gyrokinetic model

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An alternative form of the toroidal momentum transport equation is derived which is suited for 1D transport codes such as ASTRA [1, 2]. It expands on a previous formulation [3], which considered the in–out asymmetry of the toroidal rotation. In the present formulation, this is taken into account by detailing the poloidal and diamagnetic contributions to the transport equation for toroidal momentum, rewritten in terms of averaged parallel velocity as it is implemented in ASTRA.

A comparison with the formal solution of the gyrokinetic equation as expressed in the plasma rotating frame of reference (specified by an $\mathbf{E} \times \mathbf{B}$ –driven toroidal rotation) [4, 5] allows to identify the relevant transport coefficients and how they should be included in the 1D transport equation. Moreover, the effect of including poloidal and diamagnetic flow corrections [6] in the equilibrium Maxwellian is also discussed.

References

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