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P5.1014 Beam-plasma system as reduced model for energetic particle ITER relevant transport

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With the aim of finding and validating reduced models able to reproduce the relevant features of the energetic particle interacting with the Alfvénic spectrum, we define a mapping procedure (based on the resonance rule) between the reduced radial profile of the burning plasma scenario and the velocity space of the beam-plasma system [1, 2, 3]. The map is defined around a single reference resonance, resulting in a linear (local) relation, and then extended to the multiple mode case. This technique is applied to the reduced ITER 15MA beseline scenario analysed in Ref.[4] (see also Ref.[5]), in the presence of the least damped 27 toroidal Alfvén eigenmodes. Mode saturation and energetic particle redistribution are analysed, and avalanche effects on the spectral evolution and domino (convective) transport well emerges from simulations in agreement to Ref.[4]. This outlines the importance of the stable (sub dominant) component spectrum. Moreover, quasi-linear equations are mapped in the radial dimension and numerically integrated for the addressed multi mode case. The obtained quasi-linear profiles differ from non-linear simulations since they clearly do not reproduce avalanche phenomena and outer redistribution of energetic particles.

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