Nonlinear PIC simulations of Alfven modes and turbulence

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Tokamak plasmas are complex systems where microturbulence, meso-scale zonal flows and macroscopic MHD instabilities like Alfvénic modes (AM), mutually interact. In this presentation, gyrokinetic numerical simulations of the interaction of AM and turbulence via ZF are discussed [1]. The gyrokinetic global particle-in-cell code ORB5, developed for turbulence studies, and extended to its electromagnetic multi-species version, is used. The mechanism of generation and saturation of the ZS is described, and its role in the dynamics of AM and of turbulence.

[1] A. Biancalani, et al, 46th European Physical Society Conference on Plasma Physics, July 8th-12th 2019, Milan.