Electromagnetic full-*f* continuum gyrokinetic simulation of plasma turbulence in scrape-off layer of ASDEX Upgrade

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We report our numerical observation of seeded blob dynamics at the SOL region of tokamak. We have used Gkeyll computational plasma framework [1] to perform our 5D gyrokinetic simulation for helical open magnetic field lines. We simulate for plasma parameters similar to ASDEX upgrade experimental shots [2]. Toroidally elongated coherent density structures (known as plasma blobs) are seeded just outside the LCFS. The blobs propagate radially outward and further break into smaller structures depending on the different plasma parameters. The dynamics of the blobs are found to vary as plasma density and temperature is varied. The blob dynamics is also found to be sensitive to the perpendicular and parallel extent of the blobs. A detailed numerical study is performed for various plasma parameters to measure the radial and poloidal blob-velocity as the blobs propagate within the SOL region [3].

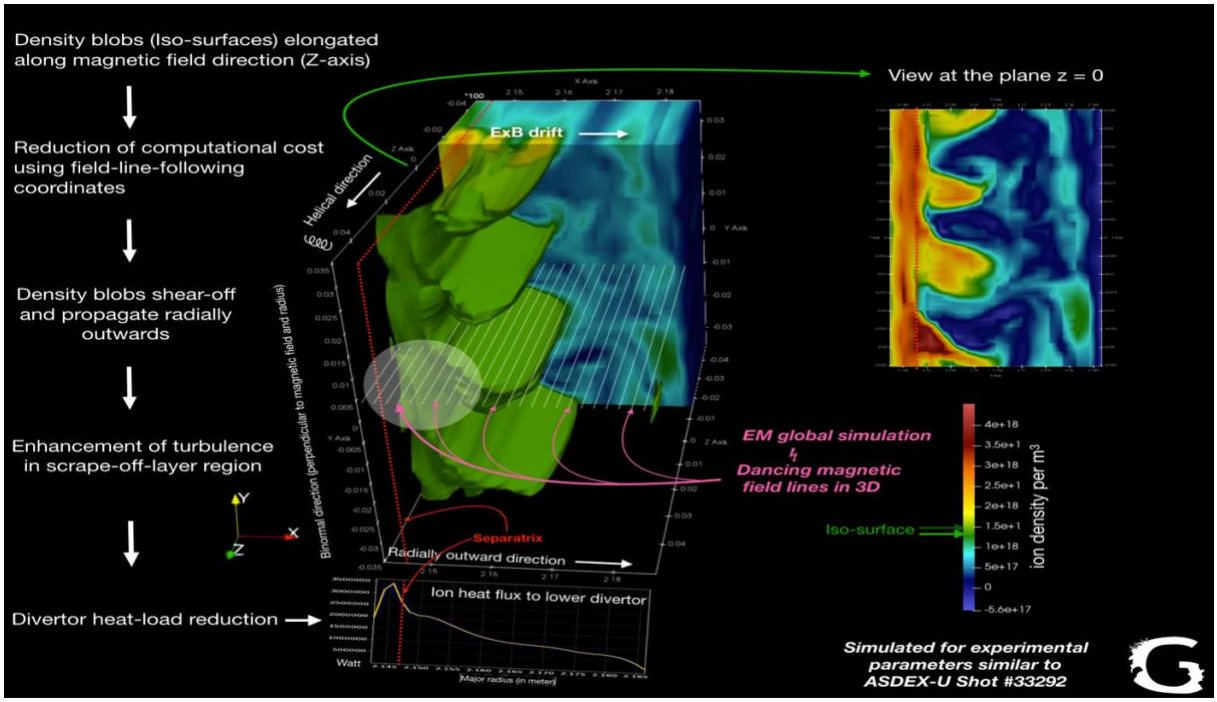

Figure 1: *Gkeyll simulation for ASDEX-like parameters on helical open field lines showing density filaments shearing off from the separatrix region.*

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References:

[1] N. R. Mandell, et al., *Journal of Plasma Physics*, **86**, 905860109 (2020)
[2] D Carralero, et al., Nuclear Fusion, **58**, 096015, (2018).
[3] R Mukherjee, et. al., Bulletin of the American Physical Society, (2021).