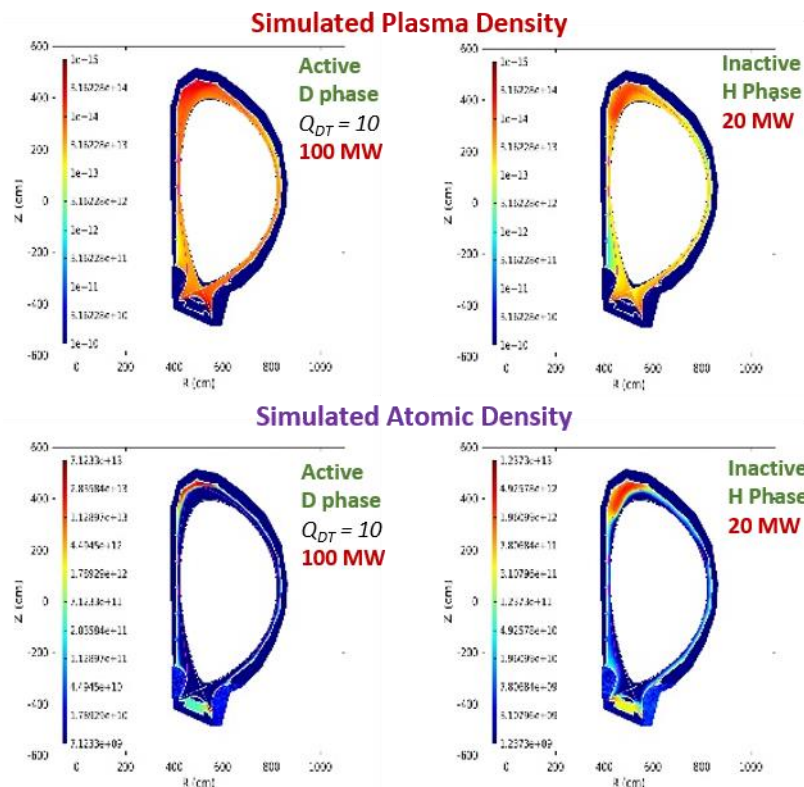


First 3D ITER Burning Plasma Scrape-off Layer Simulations in Real Magnetic and Wall Geometry

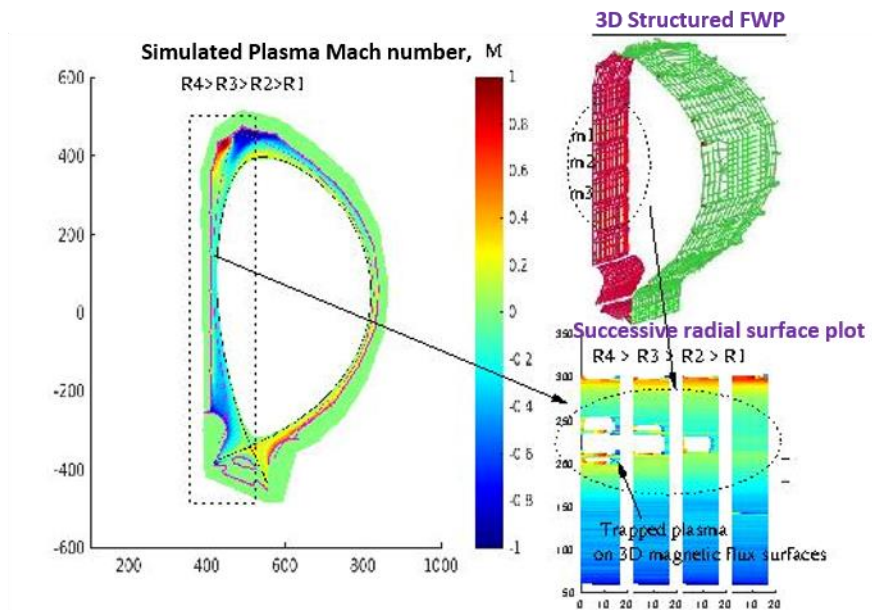
Simulations done by IPR under a contract agreement from ITER Organization, France (IO/21/CT/4300002408, 2021-23)

- Final deliverables accepted by ITER in Jan 2023.
- An on-site presentation of the simulation result by IPR-PI is scheduled by ITER in May-June 2023 at ITER-IO
- A collaborative presentation on the work is proposed by IPR and ITER at 29th IAEA Fusion Energy Conference (FEC 2023), 16-21 Oct 2023, London, UK
 - Simulated 3D plasma to serve as authentic ITER plasma for design, optimization and research purposes before first ITER burning plasma accessed
 - H-mode operation simulated in ITER q95 ~3 baseline equilibria ($I_p = 15$ MA, $B_T = 5.3$ T, or 7.5 MA, 2.65 T and 5.0 MA, 1.8 T, with two separatrix gaps; $\Delta r_{sep} \sim 9$ cm and ~ 6.5 cm)
 - Density, velocity and temperature in critical SOL divertor regions of entire torus are simulated following magnetic flux-surface aligned coordinates, for the first time in multiple magnetic zone setup closest to realistic ITER operation regime
 - 3D information of particle and power deposition on First Wall Panels to augment nuclear material migration during ITER operations by 3D capable migration codes, presently using 2D plasma backgrounds



Distributions of plasma and neutral parameters in a selected Radial-Poloidal plane

- Simulated plasma distributions to be used in designing Main Chamber Recycling (MCR) Monitoring spectroscopic Diagnostics
- 3D simulations to construct full plasma start-up phase of the ITER operation continues under a visiting researcher program between IPR and ITER-IO



Mach number of the plasma flow on the successive radial magnetic surfaces and its mapping on the 3-dimensional ITER first wall panels (Top-right)