

Summary Slides

Title: PLASMA TRANSPORT IN TOROIDALLY DISCONTINUOUS LIMITER
GENERATED 3D SOL CONFIGURATIONS OF ADITYA TOKAMAK

- Scrape off Layer in tokamak is the open magnetic field line region where the transport and flow properties are different than the central core region having closed magnetic field line structure.
- The scrape off layer in tokamak Aditya is also complex due to presence of toroidally localized poloidal ring limiter and need dedicated experiments and 3D models like EMC3-EIRENE we have used in this analysis.
- The 3D simulation of Plasma transport in the Scrape-Off Layer of tokamak Aditya is done using 3D plasma neutral transport model EMC3-EIRENE for two different configurations (one previous ring limiter configuration and another a configuration having three block limiters on outboard similar to Aditya-Upgrade) to address issues like 3D flow patterns, connection length patterns, recycling flux and parallel and perpendicular flux and others.
- These set off simulations at constant input density, diffusivity and power indicate that the diffusive transport in perpendicular direction and recycling flux will be significant in ring limiter in comparison to 3 block limiter configurations which give us a signature that block limiter types of configuration and infact Aditya-Upgrade will be better for controlling particle and heat flux.
- For better understanding the situation issues like increase of density and power in real tokamak experiments we have done simulations at different input densities varying from 2.5×10^{11} ($/\text{cm}^3$) and different input Power (60kw-250kw) at LCFS in our simulation model.
- These simulations with varying density shows that diffusive flux in perpendicular direction and recycling flux will be consistently higher in ring limiter types of configurations irrespective of different input densities in comparison to 3 Block limiter types of configurations.
- These simulations with varying input power at constant diffusivity and density indicate that heat transport will be more in block limiter types of configurations as the gradients of electron temperature will be strong in block limiter types of configurations near LCFS.
- The 3D simulations with varying input density, power and diffusivity indicate that the recycling flux is consistently low in 3 Block limiter types of configurations and gives us a signature that in Aditya Upgrade with belt and block Limiters the recycling and particle flux will be less in contrast to old ring limiter configurations.
- A clear and better understanding is possible by implementing the exact PFCs in our 3D model in near future.