Divertor modelling: Status and aims

Bruce Lipschultz, moderator

Talks during Modelling session

- 11:40 AM - 12:10 PM: Martine Baelmans

  Model advancements in mean-field plasma edge codes to enable computationally achievable simulations of the ITER and DEMO reactors

- 12:10 - 12:35: Patrick Tamain

  Self-consistent integration of plasma transport and divertor physics in the SOLEDGE3X-EIRENE code: status, results and prospects

- 12:35 - 14:00: Lunch

- 14:00 - 14:20 Wouter Dekeyser

  Progress towards robust divertor and exhaust scenario optimization with SOLPS-ITER

- 14:20 - 14:40: Aaro Järvinen

  Parametric scaling of power exhaust in EU-DEMO SOLPS-ITER simulations

Talks during Modelling session

- 14:40 - 15:00: Cyd Cowley

  Detachment Control Considerations for Divertor Design
- 15:00 - 15:20: Guido Ciraolo

  Impact of divertor geometry on separatrix density in JET H-mode plasmas and derivation of a scaling law as a function of engineering parameters
- 15:20 - 15:40: Ou Pan

  SOLPS-ITER simulations of an X-point radiator in the single-null and snowflake divertor configurations in ASDEX Upgrade and EU-DEMO
- 15:40 - 16:00: Dmitriy V. Borodin

  EIRENE modelling w/improved CRMs for spectroscopic detachment control in EU-DEMO
- Break
- 16:20 – 17:20: Discussion for modelling talks

Themes of Modelling development presented

- Speeding up codes to make them useful for modelling large reactors (Baelmans)
  - What is the progress? What are the next steps (including timescale)?
- Use turbulence codes to create transport coeff. for use in mean-field codes (Tamain, Baelmans)
  - What is the progress and next steps (including timescale)?
- Evaluation of 1D models for predicting divertor performance (Järvinen, Cowley)
  - Is missing physics a problem (Järvinen)?
  - Can the models be used to predict what divertor characteristics (e.g. magnetic topology, closure....) have the biggest effect on performance/control (Cowley)?

Themes of Modelling development presented

- Validation of modelling codes against current experiments (Ciraolo, Pan)
  - What will it take to give us confidence in predicting reactor divertor? Are we stuck with ‘best we can do’?
- Use optimization methods to find the best divertor design (take out human subjectivity (Dekeyser)
  - Can we optimize on enough criteria? How to evaluate if better than human-driven design?
- Upgrading physics and geometry in codes to make better predictions (Borodin, Tamain, Baelmans)
  - geometry, grids, atomic and molecular physics processes. Other?