Multi-Machine Modelling of ELMs & Pedestal Confinement: From Validation to Prediction

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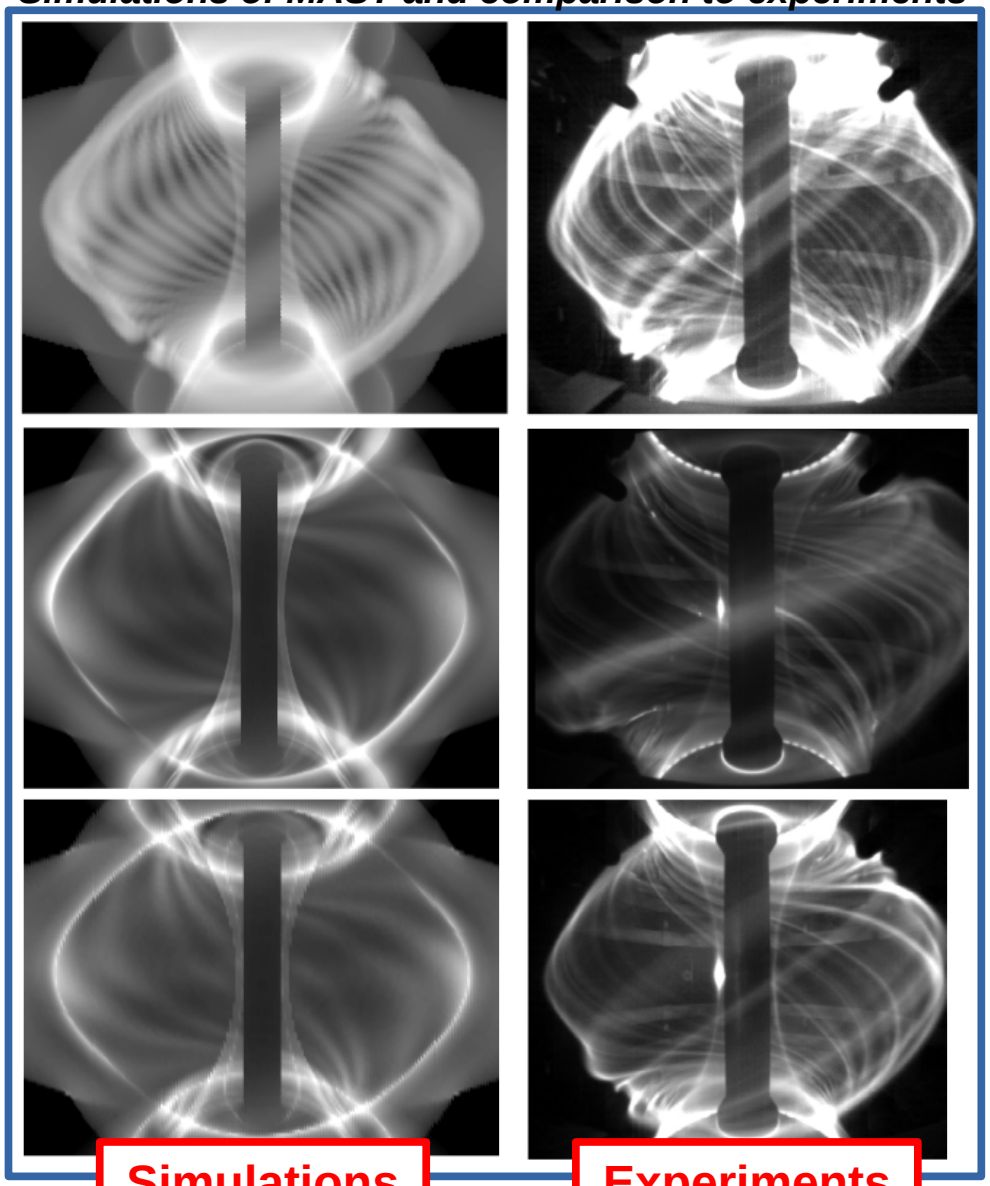
Future devices like JT-60SA, ITER and DEMO require quantitative predictions of pedestal density and temperature levels, as well as (inter-ELM and ELM) divertor heat fluxes, in order to improve global confinement capabilities while preventing divertor erosion/melting in the planning of future experiments. Such predictions can be obtained from dedicated pedestal models like EPED, and from non-linear MHD codes like JOREK, for which systematic validation against current experiments is necessary. In this paper, we show progress in the validation of the JOREK code using MAST, KSTAR, ASDEX Upgrade, DIII-D, JT-60U and JET simulations, with both qualitative and quantitative comparisons to experiments, and we present the latest achievements of EUROPED as an extension of the EPED model, to clarify the pedestal width description based on kinetic ballooning modes and turbulence. In addition, we describe how JOREK and EUROPED can interact to improve pedestal predictions in cases where ideal MHD fails to describe experimental observations, which is the case for many type-I ELMs in JET-ILW.

Simulations of MAST and comparison to experiments



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