Contribution ID: **23** Type: **Poster**

Development of a magnetohydrodynamic solver for high-fidelity numerical modellling of liquid metals

Tuesday 4 November 2025 13:25 (10 minutes)

One of the key engineering challenges in fusion reactor development lies within the breeding blanket system. In several next-generation designs, including those proposed in STEP, liquid metals such as lithium-lead are employed both as tritium breeding media and as coolants. While these materials offer advantages in thermal efficiency and radiation shielding, they introduce significant complexity due to magnetohydrodynamic (MHD) effects. As these electrically conductive fluids flow through the reactor's intense magnetic fields, Lorentz forces suppress turbulence and fundamentally alter heat and momentum transfer. Understanding and accurately predicting MHD turbulence under these conditions is critical to the safe, efficient design of fusion components. This poster presents numerical solver development for MHD flow and investigation of MHD turbulence in liquid metal flows through high-fidelity numerical simulation.

Confirm eligibility

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Session Classification: Poster Session