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3D Thermo-fluid MHD simulation in a complex flow geometry

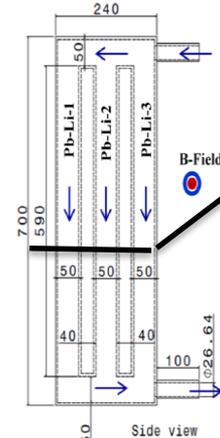
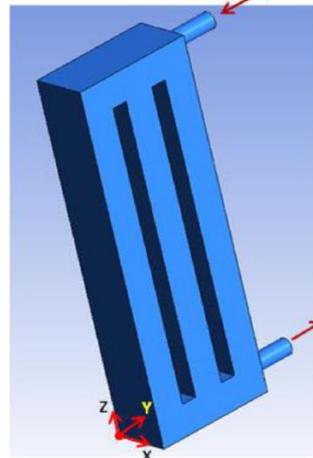
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- Magneto-Hydrodynamic (MHD) deals with the flow of conducting fluid in presence of transverse magnetic field.
- MHD is an issue that needs to be addressed for the design and development of liquid breeder fusion blankets.
- In the present paper the Pb-Li MHD flow in a complex flow geometry having parallel flow configurations and manifolds, have been studied numerically using add on MHD module of ANSYS FLUENT. The structural walls are electrically conducting.
- When electrically conducting fluid moves in presence of a transverse magnetic field, an induced emf generated which drives an electric current inside the fluid. The induced electric current further interacts with the magnetic field and generates the Lorentz force ($J \times B$) which acts in direction opposite to the flow.
- As a consequence, high MHD pressure drop occurs and flow profile inside the flow channels gets modified as compared to the flow profile of Hydro-dynamic case.

Numerical model



2D view of model along with dimensions (in mm)

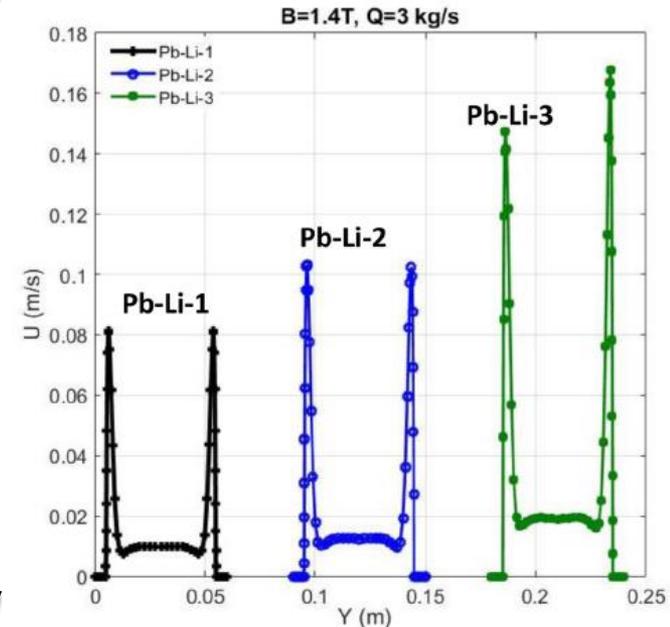


Fig. Velocity profile between two side walls (walls parallel to the magnetic field) of each flow channel at middle cross-sectional location.

- The M-shaped MHD velocity profiles have been observed inside the flow channels between two conducting side walls.

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