# Multiphysics simulation of oscillatory vapor shielding in a liquid metal divertor

- **Problem**: experiments (Magnum-PSI, FTU) have shown oscillatory behaviour of LM surface temperature during plasma exposure. This phenomenon is called *oscillatory vapor shielding*.

- **Aim of the work**:
  - develop simplified models for the phenomena relevant for vapor shielding:
    - Interactions between plasma and vapor cloud formed in front of the target as a consequence of LM evaporation
    - Thermal response of the divertor.
  - Couple the two models.
  - Apply the resulting models to a possible LMD for the EU-DEMO.

- **Prerequisites**: NFRP, ICHT.

[1]
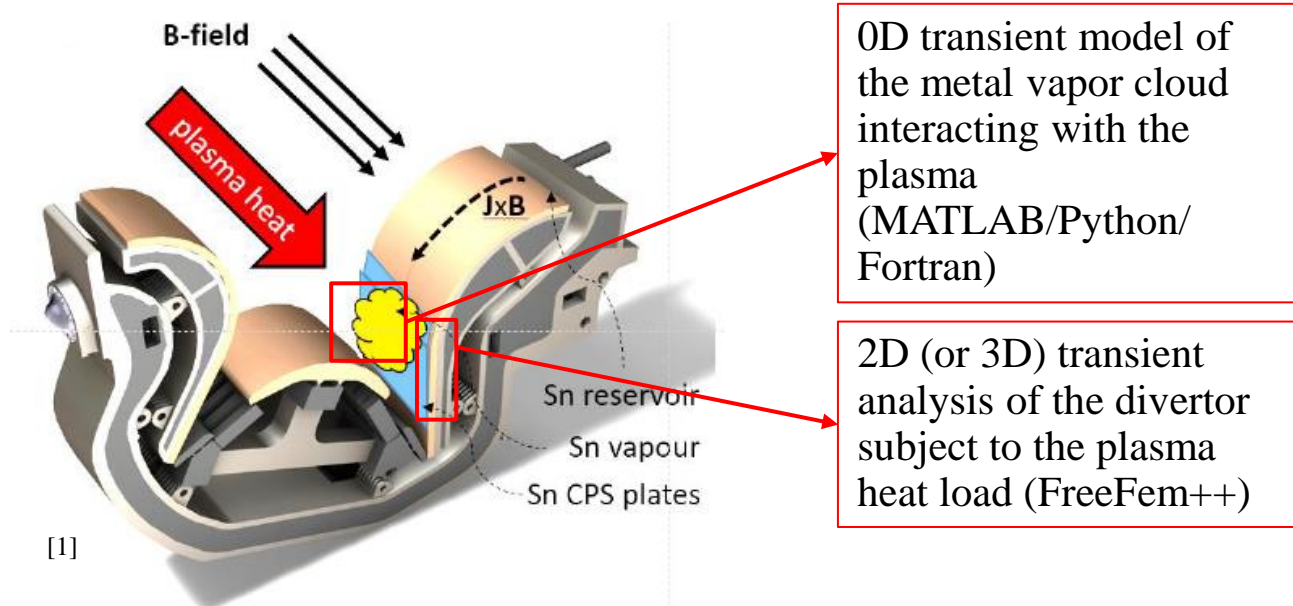
0D transient model of the metal vapor cloud interacting with the plasma (MATLAB/Python/ Fortran)

2D (or 3D) transient analysis of the divertor subject to the plasma heat load (FreeFem++)
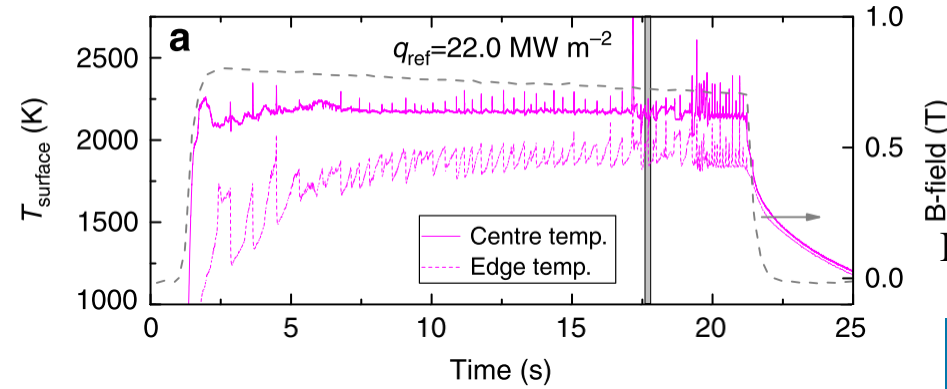
In collaboration with

Evolution of the liquid Sn surface temperature during plasma exposure in Magnum-PSI [2]

[1] G. G. van Eden, T. W. Morgan, P. Rindt, V. Kvon, M. C. M. Van de Sanden & DIFFER Pilot-PSI / Magnum-PSI team , "Power handling and vapour shielding of Sn and Li CPS targets in PILOT-PSI/Magnum-PSI" presented at ISLA-5, – International Symposium on Liquid Metal Applications for Fusion, Moscow 2017
[2] G. G. Van Eden, V. Kvon, M. C. M. Van De Sanden, and T. W. Morgan, "Oscillatory vapour shielding of liquid metal walls in nuclear fusion devices," *Nat. Commun.*, vol. 8, no. 1, 2017.