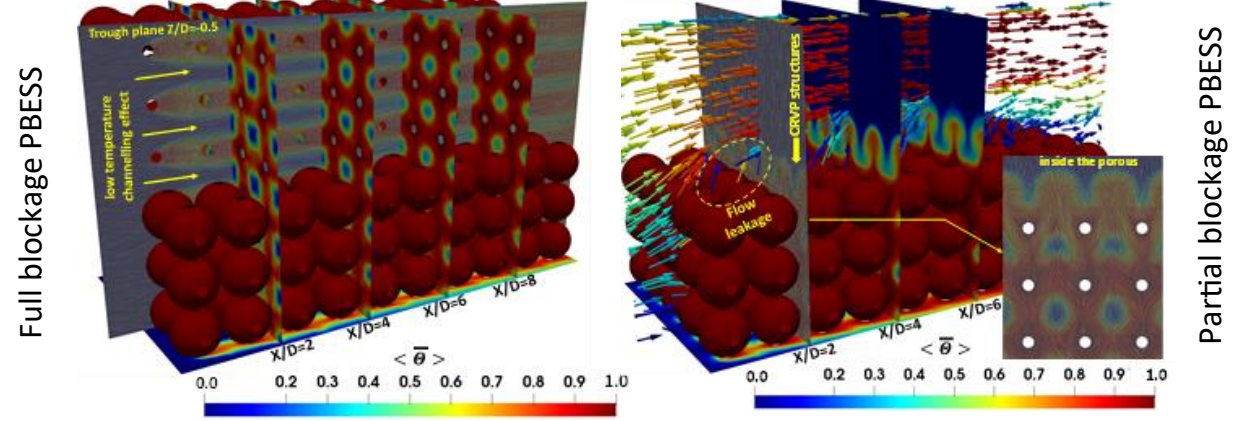
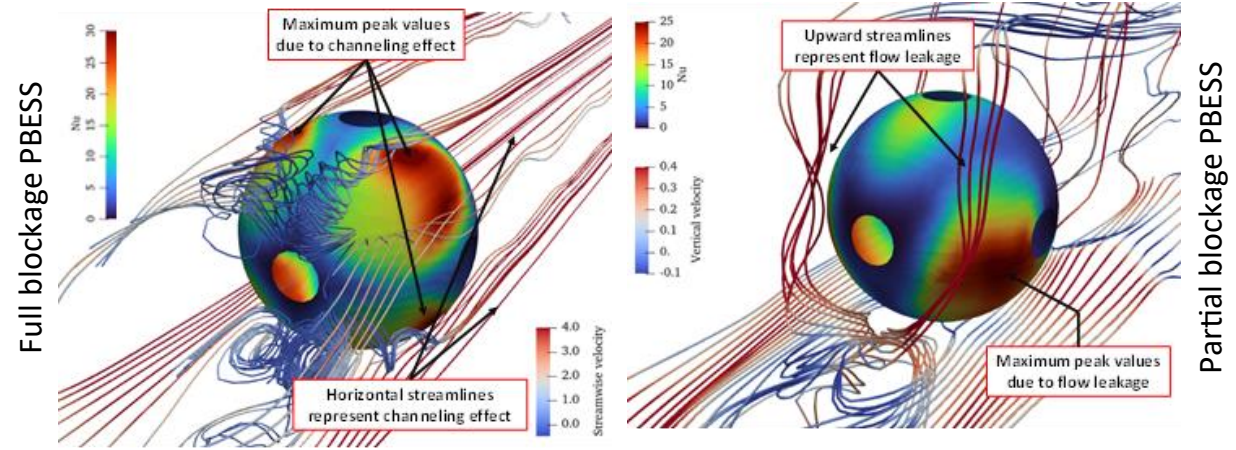


# Graphical abstract

## Pore-scale LES of Turbulent Heat Transfer in Packed Bed Thermal Energy Storage Systems (PBES)



Non-dimensional time-averaged temperature overlaid with streamlines illustrating two important flow physics: channelling effect and flow leakage



The impact of the flow leakage and channelling effects on the distribution of Nusselt number over the pore elements of the full blockage and partial blockage packed bed thermal energy storage system