

Title : Hybrid AutoEncoder/Galerkin approach for nonlinear parametric reduced order modelling

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Abstract : This presentation introduces a novel hybrid Reduced Order Model (ROM) technique that combines Proper Orthogonal Decomposition (POD)-Galerkin models with data-driven approaches. By incorporating deep learning techniques both in the modeling of the orthogonal subspace and in the time integration phase, it corrects errors within and beyond the POD subspace. The hybrid ROM is trained using a neural Ordinary Differential Equation (ODE) framework, improving both accuracy and stability. Testing on the viscous Burgers equation and parametric Navier-Stokes equations demonstrates that this method outperforms traditional ROMs, autoencoder-based models, and advanced hybrid approaches, delivering better interpretability, accuracy and low computational cost.