Reduced Order Models With Moving Domains

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Abstract—The research objective is to build a Reduced Order Model (ROM) for a two-dimensional parametrized unsteady PDE with a moving boundary:

- Heat diffusion problem.
- (Bonus) Graetz convection-diffusion problem.

Both the main body of the PDE and the geometrical definition of the moving boundary will be parametrized.

A concise description of the reducing procedure is provided, together with a priori convergence rates for basis size estimation and a posteriori error estimators to certify the use of the Reduced Order Model. Numerical examples to showcase computational costs and implementation details are designed, implemented and validated with the Manufactured Solutions Method.

Index Terms—Reduced Order Model, Moving Domain, FEM, DEIM, POD, Galerkin-Projection

1 Vocabulary Definition

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