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# COUPLED PARTIAL DIFFERENTIAL EQUATIONS ACROSS DIMENSIONS – DISCRETIZATION APPROACHES AND APPLICATIONS

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## ABSTRACT

The application of physical models to practical engineering problems often requires to simultaneously solve equations in different dimensions, typically called mixed-dimensional partial differential equations (PDEs). Such equations couple unknown fields defined over domains of differing (mixed) topological dimension. Mixed-dimensional PDEs naturally arise in a wide range of fields including geology, biomedicine and fracture mechanics and fluid-structure interaction.

Mixed dimensional problems also commonly arise when imposing non-standard conditions over a subspace of lower dimension such as through a Lagrange multiplier. With the progressive cross-fertilization and integration of different areas of mathematics, such as analysis and approximation of PDEs, network science and graph analysis and operations research, the study of mixed dimensional PDEs is becoming a lively field of research with its own identity.

This minisymposium is dedicated to all aspects of coupled partial differential equations across dimensions, with particular attention to accurate and robust methods for their discretization and for the efficient solution of the corresponding matrix equations. The minisymposium is also aiming to attract scientists form a broad range of scientific communities who are currently using mixed-dimensional PDE models for their research.