

HYBRID DISCONTINUOUS GALERKIN METHODS FOR PDES ON HYPERGRAPHS AND NETWORKS OF SURFACES

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ABSTRACT. We introduce a general, analytical framework to express and to approximate partial differential equations (PDEs) numerically on graphs and networks of surfaces – generalized by the term hypergraphs. To this end, we consider PDEs on hypergraphs as singular limits of PDEs in networks of thin domains (such as fault planes, pipes, etc.), and we observe that (mixed) hybrid formulations offer useful tools to formulate such PDEs. Thus, our numerical framework is based on hybrid finite element methods (in particular, the class of hybrid discontinuous Galerkin methods).

Keywords: hybrid finite elements, hypergraphs, continuity equations

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