

# HYBRIDIZATION OF DISCONTINUOUS GALERKIN FINITE ELEMENT APPROXIMATIONS

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In the last several years a new hybridization technique for finite element approximations of differential equations has been introduced by B. Cockburn and J. Gopalakrishnan. The main idea of this new approach combined with the technique of lifting operators from the discontinuous Galerkin (DG) method led to a unified hybridization framework for DG, mixed, nonconforming, and conforming finite element approximations. In the talk we shall discuss this general hybridization technique for second order elliptic problems. This method has three main building blocks: (1) the finite element spaces of the local solutions, (2) the numerical traces of the solution and the flux, and (3) the space of the Lagrange multiplier.

With appropriate choices of these three components we can reproduce the known hybridization of the mixed finite element method. Specialized to the interior penalty (IP) DG approximations the proposed method fully characterizes the class of hybridizable IP DG schemes. We show that from the known IP DG methods only the IP scheme due to Ewing, Wang, and Yang is hybridizable. Further, we show that most of the locally DG schemes are hybridizable and we characterize these schemes.