BOLU - DÜZCE

MATEMATİK SEMİNERLERİ

TIME-SPACE ADAPTIVE SOLUTIONS OF DIFFUSION-CONVECTION EQUATIONS with NON-LINEAR REACTION MECHANISM USING DISCONTINUOUS GALERKIN in SPACE

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Abstract: Many engineering problems such as chemical reaction processes, heat conduction, nuclear reactors, population dynamics, porous medium in geosciences etc. are governed by coupled convection-diffusion partial differential equations (PDEs) with non-linear source or sink terms. It is a significant challenge to solve such PDEs numerically when they are convection/reaction-dominated, and the standard Galerkin finite element methods (FEMs) are known to produce spurious oscillations, especially in the presence of sharp fronts in the solution, on boundary and interior layers. In this work, we solve the semi-linear diffusion-convection-reaction equations adaptively based on residual-based a posteriori error estimation using discontinuous Galerkin FEMs in space, in an accurate and efficient way. Theoretical a posteriori error bounds are also provided.

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