

Discretization of linear transport models using Trefftz discontinuous Galerkin method.

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Abstract

This work deals with the study of a Trefftz Discontinuous Galerkin (TDG) scheme for a model problem of transport with linear relaxation. The model is written as the P_N approximation of the transport equation and we study in more details the P_1 and P_3 models. We show that TDG method provides natural well-balanced and asymptotic preserving discretization since exact solutions are used locally in the basis functions. High order convergence with respect to the mesh size in two dimensions is proved for the P_1 model. In particular, it is shown that TDG method needs less degrees of freedom to reach a given order compare to the standard DG method. Numerical results in dimensions 2 illustrate the theoretical properties.