

In the present work we deal with the stability of the space-time discontinuous Galerkin method applied to non-stationary, nonlinear convection - diffusion problems. Discontinuous Galerkin method is a very efficient tool for numerical solution of partial differential equations, combines the advantages of the finite element method (polynomial approximations of high order of accuracy) and the finite volume method (discontinuous approximations).

After the formulation of the continuous problem its discretization in space and time is described. In the formulation of the discontinuous Galerkin method the non-symmetric, symmetric and incomplete version of discretization of the diffusion term is used and there are added penalty terms to the scheme also. In the third chapter are estimated individual terms of the previously derived approximate solution by special norms. Using the concept of discrete characteristic functions and the discrete Gronwall lemma, it is shown that the analyzed scheme is unconditionally stable. At the end, in the fourth chapter, are given some numerical experiments, which verify theoretical results from the previous chapter.