A shock-capturing discontinuous Galerkin method for the numerical solution of inviscid compressible flow

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The numerical solution of the compressible Euler equations obtained by discontinuous Galerkin method suffers from the Gibbs-type oscillations in the vicinage of discontinuities. These non-physical overshoots and undershoots of the discrete solution corrupt the solution and have to be supperessed. In order to avoid this phenomenon the shock-capturing approach is proposed. The main idea is based on adding the artificial diffusion term to the original system in the form which corresponds to the viscous part of the compressible Navier-Stokes equations but with the variable viscosity. This viscosity is proportional to the entropy residual of the system and thus the accuracy of the method is preserved. Numerical experiments reflecting the potency of this approach are presented.