MODIFICATION OF THE DISCONTINUOUS GALERKIN METHOD WITH TIME-DEPENDENT BASIS FUNCTIONS

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In calculations using the discontinuous Galerkin method (DGM) [1], there is often a loss of accuracy in the areas of shock wave localization. One of the solutions to this problem would be the technique [2–4], which preserves the ideology of through-counting schemes, recognizes the position of shock waves, effectively suppressing the presence of non-physical oscillations, and preserves the accuracy of the technique in areas of the solution smoothness. In this paper, this concept is implemented by using time-dependent basic functions in DGM. The use of such basic functions makes it possible to calculate strong discontinuities in a natural way and at the same time ensure the fulfillment of entropy inequality. The key point of this scheme is the determining the coefficient α algorithm, which is responsible for the accuracy of the discontinuities positions determining in the numerical solution and, the accuracy of the consequently computational scheme quality. A series of calculations allows us to talk about the possibility of using this scheme for solving problems with areas of high solution gradients. When we are solving problems on a detailed grid with a new modification of the DGM, there are no oscillations in the numerical solution. When we are solving problems with the classical discontinuous Galerkin method, the oscillations are observed.

References

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