

# Numerical integration in the Discontinuous Galerkin method for elliptic problems

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**Abstract:** Various Discontinuous Galerkin formulations for elliptic partial differential equations are known. Among others, the nonsymmetric interior penalty Galerkin (NIPG) and also symmetric version (SIPG) are perhaps the most popular. Various articles studying stability and error estimates of the resulting schemes appeared. However, quite a little attention is paid to the effect of numerical integration applied to the evaluation of individual terms appearing in the formulations.

In this paper/presentation we investigate the effect of numerical integration applied to the linear elliptic equation with nonconstant coefficients. We derive sufficient conditions which ensure that the resulting numerical schemes with integration will possess a unique solution and will preserve the accuracy of the method. Finally, we discuss these results in the view of the semiregular triangulations admitting almost degenerated (only in a suitable way) triangular elements.

Our results will be followed by few numerical examples.