# Controlling oscillations in high-order accurate methods through neural networks

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While discontinuous Galerkin methods have proven themselves to be powerful computational methods, capable of accurately solving a variety of PDE's, the combination of high-order accuracy and discontinuous solutions remain a significant challenge. Traditional methods such as TVB limiting or artificial viscosity methods have several disadvantages, e.g., a need to specify one or several parameters or the complexity of the methods to avoid overdissipation.

In this talk we discuss recent developments in which an artificial neural network is used as a troubled cell indicator in limiter based methods or to estimate the nonlinear viscosity in artificial viscosity methods. The neural network is trained independently and is therefore not problem dependent.

Extensive computational results in one- and two-dimensions shall demonstrate the efficiency of such techniques which, as we shall likewise demonstrate, are often both superior and faster than traditional techniques.

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