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**Jie Shen\***, Department of Mathematics, Purdue University, West Lafayette, IN 47906. *A New Spectral-Galerkin Method for High-Dimensional PDEs.*

Many scientific, engineering and financial applications require solving high-dimensional PDEs. However, traditional tensor product based algorithms suffer from the so called "curse of dimensionality". We shall present a new spectral-Galerkin method for non-periodic problems and/or in the whole space. The method is based on two basic ingredients: (i) Choosing the frequencies of the trial functions from the "hyperbolic cross"; (ii) Developing a fast transform between the "hyperbolic cross" and a suitable sparse grid. We shall present rigorous error estimates as well as numerical algorithms which make it possible to solve a class of PDEs in moderately high dimensions. (Received February 17, 2010)