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Solution of the full BGK model of the Boltzmann Transport Equation using Alternating Least Squares ARNOUT BOELENS, Stanford University, DANIELE VENTURI, University of California Santa Cruz, DANIEL TARTAKOVSKY, Stanford University — High-dimensional partial-differential equations (PDEs) arise in a number of fields of science and engineering, where they are used to describe the evolution of joint probability functions. Due to the curse of dimensionality these kind of equations are notoriously hard to solve. We develop a new parallel algorithm to solve high-dimensional PDEs and apply it to the BGK model of the Boltzmann Transport Equation (BGK-BTE). The algorithm uses an implicit time integration scheme and is based on canonical numerical tensor methods combined with a pseudo-spectral method and alternating least squares. We demonstrate the accuracy and efficiency of the proposed new algorithm in computing the numerical solution to the full BGK model of the Boltzmann Transport Equation in six variables plus time.

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