Sparse tensor product method for radiative transfer

Gisela Widmer, ETH Zürich

Abstract

The stationary monochromatic radiation equation is stated in five dimensions, with the intensity depending on space and direction.
In order to overcome the high complexity, we discretize the radiative transfer equation in two space dimensions with a tensor product finite element wavelet basis in space and solid angle. Based on the multilevel structure of the wavelets, we restrict the finite element space to the sparse tensor product of the two wavelet spaces. This reduces the number of degrees of freedom significantly, as the complexity of the problem is reduced to the number of degrees of freedom in space only (up to logarithmic terms). In order to obtain a stable formulation, we use a symmetric weighted least-squares formulation.
Numerical results will be presented for some test examples.