SPECTRAL CORRECTNESS OF THE DISCONTINUOUS GALERKIN APPROXIMATION OF THE FIRST-ORDER FORM OF MAXWELL'S EQUATIONS WITH DISCONTINUOUS COEFFICIENTS

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Abstract. The paper analyzes the discontinuous Galerkin approximation of Maxwell's equations written in first-order form and with non-homogeneous magnetic permeability and electric permittivity. Although the Sobolev smoothness index of the solution may be smaller than $\frac{1}{2}$, it is shown that the approximation is spectrally correct. The convergence proof is based on a duality argument. One essential idea is that the smoothness index of the dual solution is always larger than $\frac{1}{2}$ irrespective of the regularity of the material properties. Discrete involutions also play a key role in the analysis.

Keywords: Curl-curl problem, duality argument, involution, spectral approximation, finite elements, Maxwell's equations

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