

# 3D Helmholtz: What is the Right Algorithm?

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I will review recent progress by many people on the question of solving the Helmholtz equation for propagating high-frequency waves, in linear or sublinear complexity. The question is harder than in the elliptic case, and the better answers all seem to involve a decomposition into polarized (one-way) waves. In addition to explaining what this means in heterogeneous media, I will also discuss the usefulness of fast algorithms, some practical issues involving parallelization and legacy solvers, high-order variants, and open questions in this area. Our own contributions to this story involve joint work with Leo Zepeda, Matthias Taus, Adrien Scheuer, and Russell Hewett.

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