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Wavelet-based adaptive finite element method for Stokes problems

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Practical geodynamic problems require high-resolution numerical models. Often computational requirements for such calculations are very high and thus advanced computational strategies are needed.
Here we present adaptive finite element grid refinement method for Stokes problems often arising in computational geodynamics. The method combines finite element discretization technique and automatic grid adaptation strategy based on wavelet analysis.
The proposed method provides complete control of grid resolution and thus allows more efficient usage of computational resources. This is especially useful for problems with strong localizations such as lithospheric deformation dominated by brittle faulting. Such geodynamic simulations can be performed with serious computational savings compared to static grid approach with the same level of accuracy.