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Influence of periodically fluctuating material parameters on the stability of explicit high-order spectral element methods

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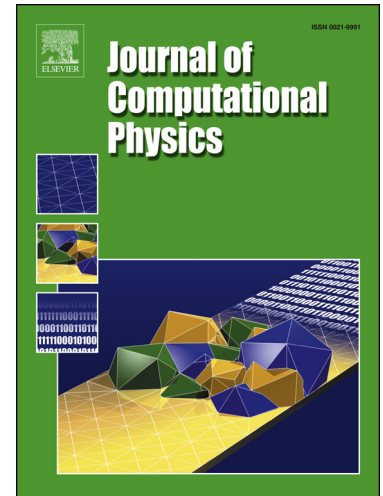
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Highlights

- Stability analysis of an explicit time marching algorithm for the spectral element method in heterogeneous media.
- The origin of instabilities that are often observed when the stability limit derived for homogeneous materials is adapted is revealed.
- Numerical examples show that adapting homogeneous formulae for heterogeneous media leads to either instability or to unnecessary increased computational resources.
- Extensions of the results derived for quadratic and cubic one dimensional spectral elements are discussed, including higher order approximations, different periodicity of the material parameters and higher dimensions.
- Numerical experiments reveal that the stability limits derived for periodically fluctuating material properties are precise when the material parameters take the same value at the vertices of the mesh even for non-periodic fluctuations.

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