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On the modeling of metamaterials with the relaxed micromorphic continuum

Generalized continua offer a modeling framework for materials exhibiting size-effects, such as metamaterials, when scale separation does not hold. The relaxed micromorphic continuum [1] characterizes the kinematics of each material point using a displacement vector and a second-order micro-distortion tensor but a relaxed curvature by means of Curl of this micro-distortion is incorporated instead of the full gradient. This demonstrated distinct advantages over other higher-order continua. Fewer material parameters are utilized due to the simplified energy compared to classical micromorphic theory. Moreover, the relaxed micromorphic model is bounded from above, avoiding the issue of unphysical infinite stiffness for small specimens which other higher-order continua exhibit.

In our presentation, we will share the primary findings from our research project conducted during the first funding period [2-3]. Additionally, we will address the challenges associated with homogenization in enriched continua, which will be a focal point of our continued investigations in the upcoming funding period.

REFERENCES

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