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A predictive micropolar continuum model for a novel three-dimensional chiral lattice with size effect and tension-twist coupling behavior

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## Highlights

- A novel three-dimensional cubic chiral lattice is proposed by introducing noncentrosymmetry into microstructure design.
- Independent micropolar elastic constants of the proposed 3D chiral lattice are deduced and a homogenization method is developed.
- The proposed constitutive model is able to predict the size effect and tension-twist coupling behavior of the proposed 3D chiral lattice.
- This work establishes a fundamental link between the macroscopic mechanical properties and microstructure of 3D chiral material.

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