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VALIDATION OF A LINEARLY ELASTIC PERIDYNAMIC MATERIAL

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Peridynamics is a nonlocal theory that extends the classical continuum theory by considering collective motion of all the material within a δ-neighborhood of any point of a peridynamic body. It considers the interaction of material points due to forces acting at a finite distance smaller than δ. A relation between interaction force and relative displacement between particles was proposed in [1] for an isotropic linear elastic peridynamic material. The relation is derived from a free energy function that depends quadratically on measures of strain that are analogous to the measures of strain of the classical linear theory. The energy function contains four peridynamic material constants. To determine these constants, we have used both convergence results of the peridynamic theory to the classical linear elasticity theory and a correspondence argument between the proposed free energy function and the strain energy density function from the classical linear elasticity theory. The calculations, reported in [2] and [3], were carried out at specific points inside the peridynamic specimens of different experiments. In this work we show further results which indicate that the expressions for these constants are valid regardless of the point chosen inside the specimens. We also show that the displacement fields associated to these experiments satisfy the corresponding peridynamic equations of equilibrium.

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