



Mathematical Physics

Fundamental solutions for isotropic size-dependent couple stress elasticity

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Fundamental solutions for two- and three-dimensional linear isotropic size-dependent couple stress elasticity are derived, based upon the decomposition of displacement fields into dilatational and solenoidal components. While several fundamental solutions have appeared previously in the literature, the present version is for the newly developed fully determinate couple stress theory. Within this theory, the couple stress tensor is skewsymmetrical and thus possesses vectorial character. The present derivation provides solutions for infinite domains of elastic materials under the influence of unit concentrated forces and couples. Unlike all previous work, unique solutions for displacements, rotations, force-stresses and couple-stresses are established, along with the corresponding force-tractions and couple-tractions. These fundamental solutions are central in analysis methods based on Green's functions for infinite domains and are required as kernels in the corresponding boundary integral formulations for size-dependent couple stress elastic materials.

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