DISCLINATIONS IN NANO- AND MICROOBJECTS

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We present up-to-date information on the analytical solutions of isotropic elasticity boundary-value problems for disclinations – defects of rotational type in solids [1]. The considered plane elasticity problems include those for wedge disclinations in uniform or two-phase cylinders, at a free surface of a half-space, and in a plate of finite thickness [2]. Three-dimensional problems under analysis deal with wedge disclinations in a bulk sphere or spherical layer or with the defects with the lines being normal to free surfaces of the plate [2].

Possible applications of the elasticity solutions for wedge disclinations are discussed [1,2]. We demonstrate that the disclination properties become a controlling factor when considering rotational plasticity in solids [3], grain boundaries and their junctions in conventional polycrystals and nanostructured materials [4], crack nucleation and initiation of ductile fracture [3], pentagonal rods and icosahedral micro- and nanoparticles [1,3], amorphous solids and glasses [3], domains, and twins in ferroelastic films adjusted to a bulk substrate [5], and defects in graphene [6].

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