# ON THE MECHANICS OF DEFECTS IN MULTIPLICATIVE ELASTOPLASTICITY

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Usual Newtonian mechanics address the movement of particles in physical space. Eshelbian or configurational mechanics, however, are essentially based on variations of the placement of particles in material space. Consequently the first approach is commonly denoted as the spatial motion problem while the second framework is referred to as the material motion problem. Configurational mechanics are of particular interest for the modelling of defects, inhomogeneities, heterogeneities and so forth in, e.g., solid mechanics; the main reason being that the evolution of such phenomena is energetically conjugate to volume forces in configurational balance of linear momentum representations.

In this contribution we aim at the elaboration of material forces in the context of multiplicative elastoplasticity, which is considered as a representative and general framework for finite inelasticity. The introduction of appropriate Eshelbian stress tensors and Eshelbian volume forces with respect to different configurations, namely the spatial, the material and - what we call - the intermediate setting, thereby turns out to be of cardinal importance.

Based on fundamental kinematic considerations, non-vanishing dislocation density tensors in terms of the plastic or elastic distortion can be introduced. These quantities, which apparently stem from the general incompatibility of the intermediate configuration, directly contribute to the intermediate volume forces. As a result, the obtained representations recapture e.g. the celebrated Peach-Koehler force which takes the interpretation of driving single dislocations. Similarly, material volume forces include, e.g., the gradient of the plastic distortion which implicitly incorporates dislocation density tensors.

**References**

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