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Modelling of Complex Elastic Crystals by Means of Micromorphic Gyrocontinua

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We model elastic crystals with a complex deformable unit cell containing many gyroscopic subparticles. To obtain the equations of this medium we use two approaches, phenomenological and microstructural. The phenomenological approach is based on the fundamental laws of balance of mechanics. We introduce analogues for the stress and the couple tensor for this micromorphic gyroscopic continuum. For the microstructural consideration we model the interaction between subparticles as a potential interaction of general kind between rigid bodies both of force and torque nature. We sum the laws of the balance of linear and angular momentum over all subparticles of a cell. To pass from the discrete model to the continuum we expand these laws in two space co-ordinates of different scale; one scale is concerned with the distance between subparticles, and another with the cell size. This theory may have applications for the description of magnetic crystals.

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