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NEW SOFT INTERFACE CONDITIONS FOR FLEXOELECTRIC COMPOSITES

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In recent years, there has been an increased interest in the study of the piezoelectric and flexoelectric properties of the materials. While piezoelectric effect describes the generation of electric polarization under a mechanical strain, flexoelectric effect refers to the electric polarization under strain gradient. Piezoelectric composites are widely used in energy harvesting, sensors and actuators. Flexoelectricity has been observed in several systems such as isotropic elastomers, liquid crystal, biological materials such as bones and biomembranes, [1]. Moreover, due to the multiple combinations of materials with elastic, piezoelectric or flexoelectric components, it is important to develop a general method to evaluate the effective material properties of composite structures in order to predict their mechanical behavior [2, 3]. The present work is concerned with the derivation of a soft imperfect interface law in a flexoelectric composite, constituted by two solids, separated by a thin adhesive layer. After defining a small parameter ε, which will tend to zero, associated with the thickness and the constitutive coefficients of the intermediate layer, the soft interface model is derived by means of the asymptotic expansions technique. The obtained transmission conditions are new and take into account strain gradient effects due to flexoelectricity.

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