

On the role of the incompressibility constraint in soft dielectric composites with high phase contrast.

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Towards the accurate modelling of soft dielectric composites, this investigation aims at demonstrating that the incompressibility constraint customarily adopted in the literature may lead to largely inaccurate predictions. This claim is grounded on the premise that, even though in these composites each phase may individually be assumed to be incompressible, the volumetric deformation of the softest phase can provide a significant contribution to the effective behaviour if the phase contrast is high enough [1]. To reach our goal, we determine the actuation response of two-phase dielectric laminated composites (DLCs) where the softest phase admits volumetric deformation. Our results, discussed in the light of the limit case in which the softest phase consists of vacuum, on the one hand, challenge the hypotheses usually assumed in the modelling of soft dielectric composites and, on the other hand, are expected to provide useful information for the design of high-performance hierarchical DLCs.

References

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