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# A Homogeneous Substitute Material for the Core Layer of Photovoltaic Composite Structures

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## Abstract

The present contribution is concerned with the computational homogenisation of mechanical properties of the heterogeneous photovoltaic module core layer. This is required since the mechanical approach with a novel layerwise theory used for efficient global structural analysis is based on homogeneous layers. This layerwise theory is build on the direct approach for plates, where all considerations are restricted to the deformable midsurface of the individual layer. Due to the geometric structure of the core layer, an anisotropic material behavior of the effective substitute material results. The resulting orientation dependence of mechanical properties is specified and visualized. Finally, based on aforementioned work, the results of anisotropic elasticity gained for the three dimensional CAUCHY continuum, are transferred to stiffness measures of surface elasticity.

**Keywords:** photovoltaic module, composite structure, homogenisation, anisotropy, direct approach, surface elasticity

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