

Composite Plates with Active Fibres

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The bending problem of composite plates reinforced with active fibers is considered. The fibers are made of a shape memory material which may undergo a martensitic phase transformation. The matrix is treated as an elastic medium. Due to the phase transformation in fibers the deformation process is dissipative and accompanied by hysteresis loops. We study the stress-induced phase transformation under isothermal conditions and control this dissipation mechanism by imposing the requirements of the second principle of thermomechanics and making use of a set of internal variables describing distributions of austenite and different variants of martensite. We formulate this hysteretic problem in the form of a variational inequality of evolutionary type. The finite dimensional counterpart of it is derived by the finite element method, and is solved incrementally as a sequence of complementarity problems. Results of numerical simulation will be presented.

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