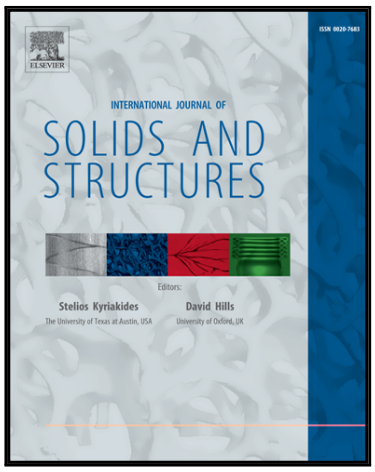

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On an alternative modelling of distributed fibre directions

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Abstract

The main contribution of this work is the introduction of an alternative approach for the fast and accurate modelling of distributed fibre directions. This method employs a quadrature rule, which uses the sample vectors of the fibre orientation distribution function as integration points. Thus, the computation time is drastically reduced compared to the classic angular integration method whereas the accuracy remains the same. The effective stress converges with increasing numbers of integration. Further studies on different sets of sample vectors reveal a dependency of the effective second and fourth moment of the orientation distribution function on the choice of the integration points and their initial position. By means of two example deformations with two different free energy densities the accuracy of the alternative method is clearly depicted over the complete range of fibre distributions. It is worth mentioning, that the method is not restricted to rotationally symmetric distributions and it is able to incorporate all five irreducible invariants of transverse isotropy. The application of the alternative

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