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Finite element procedure and simulations for a multiphase phase field approach to martensitic phase transformations at large strains and with interfacial stresses

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## Highlights

1. A rigorous finite element procedure for a novel multiphase phase field method for martensitic transformation is presented
2. The consistent tangent modulus due to elastic and structural stresses is derived
3. The procedure is verified by comparing the numerical results with the analytical solutions for a simple shear problem with single variant and a two variant-based twinning problem
4. Complex microstructure evolution under nanoindentation is obtained

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