DEVELOPMENT OF OPEN SOURCE FINITE ELEMENT SOLVER ÃƒÂ¢Ã¢Â‚Â¬Ã…Â"LD-FEMÃƒÂ¢Ã¢Â‚Â¬Ã¢Â„Â¢ FOR MODELING AND SIMULATION OF RUBBER MATERIALS

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Abstract	ÃƒÂ¢Ã¢Â‚Â¬Ã…Â"LD-FEMÃƒÂ¢Ã¢Â‚Â¬Ã‚Â• is an open source computer program working on the basis of finite element method (FEM) which is aimed to model and simulate large deformation in rubber materials. The kinematics of large deformation on the basis of the Total Lagrange framework is applied to linear 4-nodes tetrahedral element and then solved with Newton-Raphson iterative scheme. Furthermore, to obtain the material tangent stiffness directly from strain energy density functions, the Gill-Murray theory of numerical second derivative is used in LD-FEM. Finally, by using the Mooney-Rivlin strain energy function, the performance of LD-FEM is addressed for uniaxial tensile, shear and torsion loading tests. The results confirm the capability of LD-FEM to capture nonlinear behavior of the large deformation either with analytical or numerical approach on the material stiffness derivation with error less than 2%.
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