

TIME DISCRETISATION METHOD INVOLVING FRACTIONAL OPERATORS FOR HYSTERETIC SHEAR BEHAVIOUR MODELLING OF FIBRE-REINFORCED COMPOSITES

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Hysteretic shear behaviour modelling of fibre-reinforced composites can be achieved by the use of fractional rheological models [1], resulting in fractional order differential constitutive equations which, in general, provide good stress-strain correlations and require only a few parameters. Analogous to the numerical calculations of integrals, fractional derivatives can be evaluated by discretisation methods [2] but, due to their non-locality, computational and storage requirements increase as time history evolves when numerically solving the constitutive equations.

The objective of this work is to establish a new discretisation algorithm well suited for its ulterior implementation in Finite Element formulations by reducing the number of calculations needed to evaluate the fractional operators without compromising accuracy. The efficiency of this method has been analysed by comparison with classical non-reduced fractional schemes.

REFERENCES

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