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Characterisation of the Cyclic Behaviour of Elastic-Plastic-Creeping Bodies

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The paper describes a systematic theoretical approach to the characterization of the cyclic behaviour of a body that exhibits creep and plasticity. The cyclic state for a particular constitutive equation may be characterized as a minimum theorem in terms of a class of kinematically admissible inelastic strain rate history. The minimum for some particular class of approximating strain rate histories my be determined by means of a new mathematical programming method, the Linear Matching Method, that sequentially reduces the functional through the solution of linear problems. The theory is developed for the standard Mandel thermodynamic model of constitutive behaviour allowing for both plasticity and creep behaviour. Examples are given of applications typical of those occurring in the life assessment of high temperature structures where the load corresponding to a particular failure condition is required.

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