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Mohr-Coulomb Yield Criterion for Cosserat Continua

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The classical yield criterions cannot be applied directly to Cosserat continua since that the strain tensor and the stress tensor in Cosserat continua are asymmetric. In this contribution the strain tensor and the stress tensor are decomposed into symmetric and skew-symmetric components, and the formulae of stress invariants are modified for Cosserat continua. A Mohr-Coulomb yield criterion for Cosserat continuum is established in detail, and the formulae of von Mises, Tresca and Drucker-Prager yield criterions for Cosserat continua are presented as well. Moreover, elasto-plastic finite element method based on these yield criterions is addressed. One numerical example shows the superior behavior of the established Mohr-Coulomb yield criterion, and demonstrates that the Cosserat model, which incorporates an internal length scale, is capable to resolve the mesh-dependence that exists in strain localization problem for classical continua.

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