Durban, D.

Steady drawing and extrusion processes of conventional viscoplastic materials, through wedge-shaped and conical dies, are analyzed. The basic material model assumes that the Eulerian strain rate is the sum of a plastic part and a viscous part. The investigation is restricted to relatively long and tapered dies with small wall friction. Within these limitations it is permissible to treat the flow patterns as being nearly radial. The problem is thus reduced to a single nonlinear differential equation. A few exact solutions are obtained and a further analysis is given for purely viscous solids. For the latter case we demonstrate the existence of optimum die angles where the required drawing tension attains a minimum.

MSC:
74C15 Large-strain, rate-independent theories of plasticity (including nonlinear elasticity)
74C20 Large-strain, rate-dependent theories of plasticity

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