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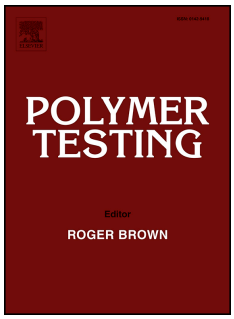

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Material Behaviour

THE ROLE OF MICROSTRUCTURE ON MELT FRACTURE OF LINEAR LOW DENSITY POLYETHYLENES

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ABSTRACT

The effects of molecular characteristics on the rheology and melt fracture of several linear and branched low-density polyethylene (LLDPE and LDPE) resins in capillary extrusion were studied as functions of molecular weight, polydispersity and the level of long chain branching (LCB). The level of LCB in the resins was found qualitatively by using several rheological methods which in general agree. These are based on the zero-shear viscosity versus molecular weight relationship, the energy of activation, the linear viscoelastic properties and the characteristic shapes of the flow curves. A previously proposed criterion (critical shear stress versus plateau modulus) for the onset of sharkskin melt fracture (Allal et al., J. Non-Newtonian Fluid Mech., 134 (2006) 127–135) was tested and found to give reasonable predictions for the sharkskin instability of the polyethylenes considered in this work.

KEYWORDS: Extrusion; melt fracture; molecular weight distribution; long chain branching; polymer blend; processing aid.