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Numerical Modeling of Extrusion of Concentric Layered Composites with Different Die Geometry*

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Abstract

The paper presents numerical modeling of the extrusion of composite materials with a concentric core-sleeve structure. The use of a convex die in different process conditions allowed, among other things, to present the flow patterns of materials depending on the geometric variant used. The obtained results regarding the effect of the die angle on the behavior of materials during extrusion indicate that in the case of using a small sleeve thickness, i.e. 8 mm, it is beneficial from the point of view of its flow to use a convex die with a working cone angle of α=100. The obtained results regarding the average predicted sleeve thickness on the product depending on the punch displacement and the tested process parameters indicated that for the initial sleeve thickness of 10 mm for both extrusion ratio λ=12 and λ=20, the average predicted sleeve thickness is almost the same and is $g_{śr}$=2.59 mm and $g_{śr}$=2.50, respectively.

Keywords: FEM, extrusion, composite, convex die

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