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Modeling of Debris Deposition in an Extrusion Filter Medium

C.L. Cox (a), E.W. Jenkins (a), P.J. Mucha (b)
(a) Department of Mathematical Sciences, Box 340975, Clemson University, Clemson,
_SC 29634-0975_
(b) Department of Mathematics, Georgia Institute of Technology, Atlanta, GA

The goal of this work is to predict reasonable lifetime of a filter used to remove debris (e.g. foreign particles and gels) from the melt stream of an extrusion process. We are developing models which incorporate non-Newtonian porous media flow through a medium whose porosity changes as debris accumulates. Boundary conditions are based on the assumption of constant flow rate and coupling with other process stages. Governing equations consist of a mass balance equation for flow of the suspension coupled with a Darcy velocity, the non-Newtonian constitutive equation, and equations for modeling particle transport and deposition. The model is being developed in a manner which allows for generalization to various domains in higher dimensions and more complex constitutive models. One-dimensional Newtonian and non-Newtonian flow models will be presented and compared to one another. Plans for continuing work will also be discussed.