

A SIMULATION-BASED OPTIMIZATION APPROACH TO POLYMER EXTRUSION FILTER DESIGN

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ABSTRACT

A challenge in polymer processing is the effective removal of debris, via filtration, from the polymer melt during the extrusion process. We propose methods for finding optimal parameters for the filter such that its lifetime is maximized, while placing reasonable restrictions on the amount of escaped debris. We make use of a three-dimensional simulation model that describes the deposition of debris particles in the filter. Optimization algorithms are used in conjunction with this simulation tool to identify the filter parameters. This is a significant problem that is not described by a differentiable function, since optimization requires the use of a simulator. Thus, we apply derivative-free techniques to analyze the behavior of the filter and to gain insight into its optimal design. We will discuss these techniques, along with approaches to formulating this problem mathematically. We present promising numerical results and point the way towards advancing this study.