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Numerical Modeling of Hollow Fiber Drawing JING YANG, YOGESH JALURIA, Rutgers University — Hollow optical fibers, which are widely used in medicine and in diagnostics, power delivery and communications, are typically manufactured by drawing a specially fabricated hollow preform down to a fiber in a conventional fiber-drawing tower. In this work, a numerical model based on the mass, momentum and energy equations is developed to investigate the drawing process. The axisymmetric flow of air in the central cavity, as well as the flow of glass and aiding purge gas, are considered. The complex computational domains are converted to cylindrical regions by using coordinate transformations. The two neck-down profiles, which are the inner and outer surfaces of the hollow fiber, are generated by using an iterative scheme. The optical thick approximation, as well as the zone model, are applied to calculate the radiative transport within the glass and the Boussinesq approximations are used for the buoyancy effects. The results obtained show that it is possible to predict the geometry of the final hollow fiber and to provide feasible combinations of parameters for successful hollow fiber drawing. The validation of the model is carried out by comparing the predictions with the results for solid-core fiber drawing and with available experimental and numerical results for hollow fibers. It is shown that the results from the model are consistent with the physical trends and agree well with the results in the literature.

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