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Experimental Analysis and Numerical Simulation of Pasta Dough Extrusion Process

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Abstract

Pasta extrusion simulation still represent a powerful challenge from a computational point of view, for both the complexity of the rheological properties of semolina dough and the process itself, in which a polymerization phenomena, driven by a combination of pressure and temperature and strongly influenced by moisture content, takes place in the final part of the extruder barrel. In this work an integrated experimental-numerical approach is proposed for numerical simulation of pasta extrusion. An extensive set of rheological data in industrial range of moisture content (MC) and temperature obtained using a capillary rheometer is reported. To overcome the reduced accuracy of Arrhenius models for pasta dough viscosity published in literature, a numerical approach based on local Taylor expansion is proposed, matching exactly experimental data. The proposed model was then validated numerically comparing numerical results obtained in the framework of Computational Fluid

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