Accepted Manuscript

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Fabrizio Sarghini, Annalisa Romano, Paolo Masi

PII: S0260-8774(15)30001-7

DOI: 10.1016/j.jfoodeng.2015.09.029

Reference: JFOE 8343

To appear in: *Journal of Food Engineering*

Received Date: 17 March 2015

Revised Date: 23 September 2015

Accepted Date: 30 September 2015

Please cite this article as: Sarghini, F., Romano, A., Masi, P., Experimental Analysis and Numerical Simulation of Pasta Dough Extrusion Process, *Journal of Food Engineering* (2015), doi: 10.1016/j.jfoodeng.2015.09.029.

Experimental Analysis and Numerical Simulation of Pasta Dough Extrusion Process

Fabrizio Sarghini[a,], Annalisa Romano[b], Paolo Masi[a,b]

[a] *University of Naples Federico II, Dept. of Agricultural Sciences, Italy*
[b] *University of Naples Federico II, CAISIAL, Italy*

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

[☆] Corresponding author
Email address: sarghini@unina.it, fax no. +39 081 7754942 (Fabrizio Sarghini)