**DYNAMIC MODELLING OF HOT MELT EXTRUSION PROCESS USING THE METHOD OF LINES**

**F. Movsesian1, M. Sousani**2**, D. Bascone**3**, I.S. Fragkopoulos3, I.K. Kookos1,\***

1 Department of Chemical Engineering, University of Patras

2 Altair EDEM, Edinburgh, United Kingdom

3 Future Manufacturing & Digital Innovation, Novo Nordisk A/S, Måløv, Denmark

*\** [*i.kookos@chemeng.upatras.gr*](mailto:i.kookos@chemeng.upatras.gr)

**ABSTRACT**

Hot melt extrusion (HME) involves the melting of materials and/or mixing and pushing of various solids under elevated temperature and pressure. It is a mature technology that has been extensively and successfully used for a broad spectrum of applications in the polymers, food and pharmaceutical industry. HME is a promising downstream processing method due to its high efficiency and economic value. Mathematical modelling of HME processes has always been challenging due to the limited understanding of the material behaviour and the demanding experimental techniques. Mathematical modeling plays an important role to determine the best operating conditions and to develop efficient software sensors or controllers. In this work, a number of mathematical modelling approaches are reviewed and some initial results on comparing their relative advantages and disadvantages are reported with emphasis on the pharmaceutical applications. Simplified models based on the Residence Time Distribution (RTD) theory are also reviewed and their suitability in approximating the results of more complex models is discussed.

**KEYWORDS:** Hot Melt Extrusion, Mathematical Modelling, Residence Time Distribution