NUMERICAL MODELLING CODE BASED ON THE FINITE VOLUME METHOD IN UNSTRUCTURED GRIDS

N. D. Gonçalves, O. S. Carneiro, J. M. Nóbrega

IPC/I3N, Institute for Polymers and Composites, University of Minho, Campus de Azurém
4800-058 Guimarães, Portugal

The design of the extrusion dies needed to produce profiles usually employs experimental trial-and-error approaches that are highly dependent on the designer experience and demand a vast amount of resources. To minimize these difficulties, numerical modelling codes are being increasingly used in the die design stage. This research team has been involved in the last years on the developed of numerical modelling codes to aid the design of thermoplastic profile extrusion dies [1,2]. The initial version of the numerical code, employ structured meshes, thus is limited to simple geometries. To expand its applicability to more complex geometries, a numerical code based on unstructured meshes is being developed. To discretize the mentioned differential conservations equations, several schemes can be applied, but Finite Volume Method (FVM) can accommodate any type of grid, being, therefore, suitable for complex geometries. In this work, the implementation employed in the new modeling code is described. It is based on the FVM with on a SIMPLE type scheme suitable for unstructured meshes.

References:

[1] J. M. Nóbrega, O. S. Carneiro, F. T. Pinho, and P. J. Oliveira, "Flow Balancing in Exdtrusion Dies for Thermoplastic Profiles – Part III: Experimental Assessment", Intern. Polymer Processing, pp. 1-11 (2004).

[2] J. M. Nóbrega, O. S. Carneiro, F. T. Pinho, and P. J. Oliveira, "Flow Balancing in Extrusion Dies for Thermoplastic Profiles – Part I: Automatic Design", Intern. Polymer Processing, pp. 1-9 (2003).