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UTILIZATION OF MESH SUPERPOSITION TECHNIQUE FOR SIMULATION OF SINGLE SCREW EXTRUDER

Ivan Gajdoš^{1*}, Emil Spišák¹, Janusz Sikora², Volodymyr Krasinskyi³

¹ Technical University of Košice, Department of CAx Technologies, Košice, Slovak Republic

² Lublin University of Technology, Department of Polymer Processing, Lublin, Poland

³ Department of Chemical Technology of Plastics Processing, Lviv Polytechnic National University, Lviv, Ukraine.

*Corresponding author: e-mail:ivan.gajdos@tuke.sk, tel.:00421-55-602-3518., Mäsiarska 74, 04001 Košice, Slovakia

Keywords: single screw extruder, mesh superposition technique, Ansys Polyflow

As the technology of polymer extrusion becomes more sophisticated, demand on possibility to accurately simulate extrusion process in full 3D rises significantly. The single screw extruder (SSE) is one of the most widely used tools, not only in the plastics and rubber industry but also in other areas such as food processing. This paper deals with application of Mesh Superposition Technique (MST), to simulate and evaluate the mixing section of SSE. Theoretical background of calculation and adoption of MST for simulation of polymer flow inside extruder barrel is described. In order to simplify the setup of a 3D unsteady SSE simulation and to avoid the use of a remeshing algorithm, technique referred to as MST has been implemented in the ANSYS POLYFLOW® software. This robust technique dramatically simplifies the meshing of the geometric entities, avoids the use of any remeshing algorithms and does not present the complexities and limitations of the sliding meshes technique.

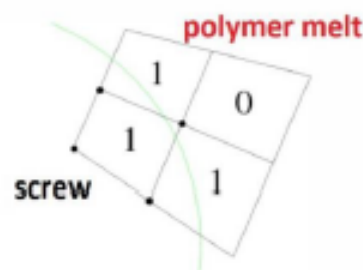


Fig. 1 Presentation of "Inside" Field for a 2D Finite Element for calculation with MST

In practical part a meshing (fig.2), preprocessing setup for calculations (fig.2) is presented with subsequent evaluation of results in ANSYS CFD-Post (fig.3).

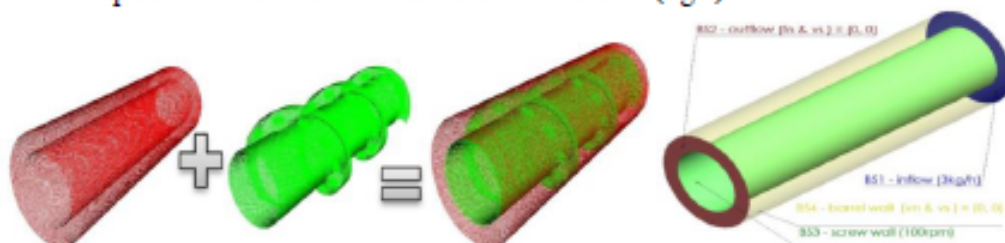


Fig. 2 Combination of the flow domain mesh and the screw mesh (left) and numerical boundary conditions

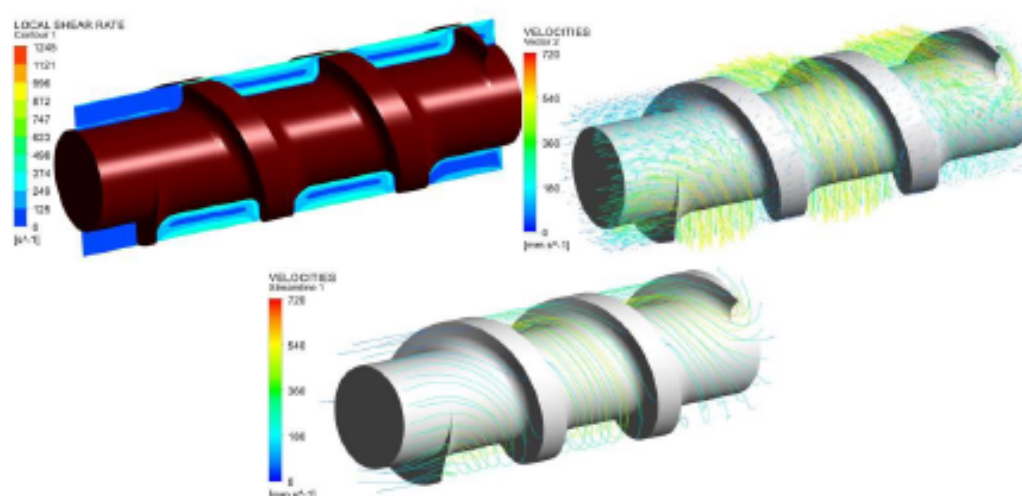


Fig. 3 Simulation results : Local shear rate, Velocities vectors through flow domain, Flow streamlines with mapped velocities values

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