Modelling the Extrusion Phase of Extrusion Blow Molding

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Most of the thermoplastic hollow containers are manufactured by extrusion blow molding (EBM). There are only a few numerical simulation codes available for the EBM process, and they do not allow the modelling of all the relevant process phases. The authors of this work are developing a set of computational tools aiming the numerical modelling of all the relevant phases of the EBM process, namely: parison extrusion, mold clamping, parison inflation and cooling. All the code are being implemented in the OpenFOAM computational library.

The parison extrusion phase aims the production of a tubular parison that will be inflated in the subsequent steps. During parison extrusion its thickness can be locally adjusted by the displacement of the inner mandrel movement, whose positioning profile can be programmed prior to production, a feature known as parison programming.

This works presents the solver developed to simulate the extrusion phase of the EBM process. The code is currently able to deal with the multiphase flow of viscoelastic fluids, which are the most appropriate constitutive models for polymer melts, and, resorting to the dynamic mesh capabilities of OpenFOAM, can also replicate the parison programming. The different features of the developed solver will be illustrated with some case studies.

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