Abstract Submitted
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Simulation of bubble growth and coalescence in reacting polymer foams[1] DANIELE MARCHISIO, MOHSEN KARIMI, DISAT - Politecnico di Torino — This work concerns with the simulation of reacting polymer foams with computational fluid dynamics (CFD). In these systems upon mixing of different ingredients polymerization starts and some gaseous compounds are produced, resulting in the formation of bubbles that growth and coalesce. As the foam expands, the polymerization proceeds resulting in an increase of the apparent viscosity. The evolution of the collective behavior of the bubbles within the polymer foam is tracked by solving a master kinetic equation, formulated in terms of the bubble size distribution. The rate with which individual bubbles grow is instead calculated by resolving the momentum and concentration boundary layers around the bubbles. Moreover, since it is useful to track the evolution of the interface between the foam and the surrounding air, a volume-of-fluid (VOF) model is adopted. The final computational model is implemented in the open-source CFD code openFOAM by making use of the compressibleInterFoam solver. The master kinetic equation is solved with a quadrature-based moment method (QBMM) directly implemented in openFOAM, whereas the bubble growth model is solved independently and "called" from the CFD code by using an unstructured database. Model predictions are validated against experimental data.

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Daniele Marchisio
DISAT - Politecnico di Torino

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