

# **Some numerical schemes for the numerical treatment of the advection equation in liquid composites moulding processes**

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## **ABSTRACT**

Liquid Composites Molding (LCM) processes simulation involves an efficient treatment of the advection equation governing the evolution of different process variables (volume of fluid, heat transfer, incubation time, etc).

In a previous work [1], a second-order scheme with flux limiters has been developed for the integration of the advection equation, which governs the volume fraction evolution. Due to the fact that other properties, like the incubation time, are not defined in the empty part of the mould, some numerical difficulties are found during the process updating [2]. The scheme described in [1] must be modified to solve the extra difficulty introduced by the advection equation governing the evolution of the incubation time. This paper describes a new flux technique, based on TVD schemes [3]-[4], for the calculation of the incubation time in mould filling simulation in thin cavities with replaced fibre mats using a fixed mesh.

## **REFERENCES**

- [1] J.A. García, Ll. Gascón, F. Chinesta, A Fixed Mesh Numerical Method for Modelling the Flow in Liquid Composites Moulding Processes Using a Volume of Fluid Technique, *Computer Methods in Applied Mechanics and Engineering*, 192:7-8, 877-893 (2003).
- [2] F. Chinesta, T. Mabrouki, A. Ramón, Some difficulties in the flow front treatment in fixed mesh simulations of composites forming processes, *ESAFORM 2002*.
- [3] A. Harten, High Resolution Schemes for Hyperbolic Conservation Laws, *J. Comput. Phys.* 49 (1983) 357-393.
- [4] Ll. Gascón and J. M. Corberán, TVD Schemes for Non-homogeneous Conservation Laws, *J. Comput. Phys.* 172 (2001) 261-297.