**Experimental characterisation of void formation in high fibre volume fraction composite produced by Resin Infusion**

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Vacuum Assisted Resin Transfer Moulding (VARTM), or Vacuum Infusion (VI), is currently under wide use in the marine and energy industries. Because VARTM process uses a single sided mould in combination with a flexible vacuum membrane on top, the use of this process allows the production of large-scale composite parts, with lower capital investment compared to resin transfer moulding (RTM) or autoclave processing. However, in order to manufacture parts meeting aerospace performance standards, the VARTM process should be subject of improvements. Such improvements are related to process repeatability, as well as dimensional stability, void and fibre content.

Controlled Atmospheric Pressure Resin Infusion (CAPRI) is a variant of Vacuum Assisted Resin Transfer Moulding (VARTM), patented by Boeing Corporation [1]. The process is similar to the conventional VARTM, however some modifications in the compaction process and applied vacuum are introduced. Prior to the infusion, cyclic compaction is applied to the fibrous reinforcement, as a form of promoting debulking and increasing fibre volume fraction. During resin impregnation, a partial vacuum is applied to the resin container, therefore reducing the pressure gradient driving the resin. This ensures a smaller thickness gradient along the part, resulting in better dimensional stability [1][2]. Despite the cyclic compaction and partial vacuum strategies used in CAPRI, for improving part quality over conventional VARTM, still there is not a clear answer about the potential improvement of CAPRI process over others belonging to the LCM family.

This study focuses on the evaluation of the resin infusion manufacturing process, based on the void content and the possibility of reaching fibre volume fractions over 60%. Additionally, some potential problems are addressed, with emphasis to through thickness resin flow, which is significantly reduced due to the fibre volume fraction increase. A comprehensive approach is detailed to understanding the mechanisms that affect the above cited flow properties.

**References**

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