



PORE-FLOW: Advanced Simulation Software for Porous Media Flow and Mold Filling

OTT1179

Applications

Resin Transfer Molding (RTM), porous media flow simulation, fluid dynamics analysis, composite manufacturing process optimization, mold filling simulation, and wicking/wetting applications.

Target Problems

Understanding liquid flow through porous materials is critical for composite manufacturing and other industrial processes. Existing simulation tools often struggle to accurately model wicking behavior, moving flow fronts, and partially saturated regions in complex porous structures. Manufacturers also face challenges in identifying dry spots, optimizing mold designs, and predicting permeability and filling performance in woven and stitched fiber mats used to produce lightweight, high-strength composite materials.

Solution

UWM researchers have developed PORE-FLOW, a specialized computational fluid dynamics (CFD) simulation tool designed to model liquid infiltration and wetting behavior in porous media. The technology provides more accurate predictions of wicking and mold-filling processes than conventional RTM simulation approaches, enabling manufacturers and engineers to optimize designs, improve material performance, and reduce production defects.

Key Benefits

- Optimizes mold design for Resin Transfer Molding (RTM)
- Visualizes liquid flow and mold filling in complex porous materials
- Identifies dry spots and partially saturated regions
- Estimates fabric permeability and mold clamping pressures
- Supports wetting and wicking process optimization
- Integrates with CFD and FEM simulation tools

About this Technology

PORE-FLOW is a computational fluid dynamics (CFD) software platform developed at the University of Wisconsin-Milwaukee for simulating liquid infiltration and wetting in porous materials. Using a Finite Element/Control Volume (FE/CV) approach, it models flow in both 2D and 3D geometries and supports Darcy and Brinkman flow formulations. The software provides more accurate wicking and mold-filling predictions than conventional RTM simulation tools and can also model open-channel fluid flow.

Stage of Development

Software developed and validated for porous media flow and mold-filling simulation applications.

Partnering Opportunity

We are seeking partners in composite manufacturing, engineering simulation software, advanced materials development, and industrial process optimization.

Intellectual Property (IP)

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Lead Inventor

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