Study of edge effects in RTM process

Goals

Isothermal filling

2D Part

Modeling of preferential paths

Copy from Madoc the file *complex_edge.vdb* and open it with Visual RTM

Studied part

We consider the piece shown in the figure below of constant thickness and equal to 3mm.

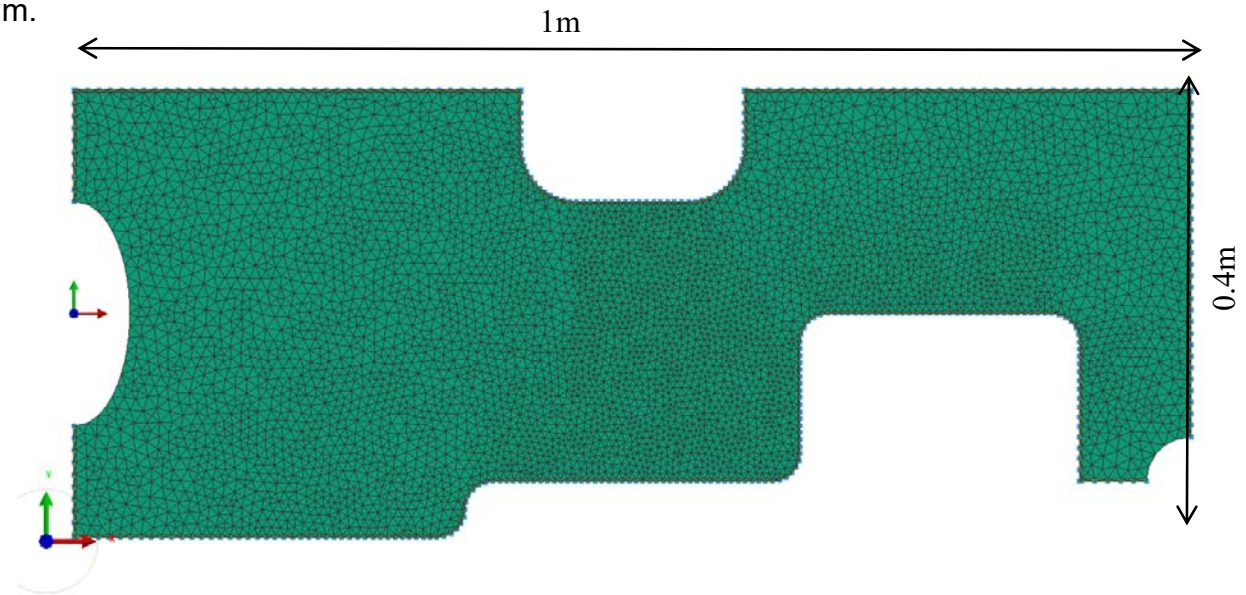

Figure 1 : Representation of the part

We want to model the edge effects during filling. For this, the mesh consists of 2 areas: a first that integrates the entire surface of the preform and a second that only the edge of the preform. To model the preferential flows, we will assume, around the periphery of the part, a second reinforcement of much greater permeability.

Material properties

During simulations, we will only focus on isothermal filling. It will be assumed that the principal directions of the permeabilities are oriented along the x, y and z axes.

Reinforcement's properties

Reinforcement 1	ρ = 2560 kg.m^{-3}	K_1=10^{-9} m²	K_2=10^{-10} m²	Porosity Φ=0.3
Edge reinforcement	ρ = 2560 kg.m^{-3}	K_1=10^{-7} m²	K_2=10^{-7} m²	Porosity Φ=0.9

Resin properties

Density : ρ = 1100 kg.m^{-3},

Dynamic viscosity: $\mu = 0.12 \mathrm{Pa.s}$

Simulations

We assume a constant injection at 2 bars.

- Considering no edge effect determine the injection and vent zones.
- Now assuming the edge effects, repeat the simulation and compare the evolution of the filling. Comment
- Now consider taking into account air trapping. Comment