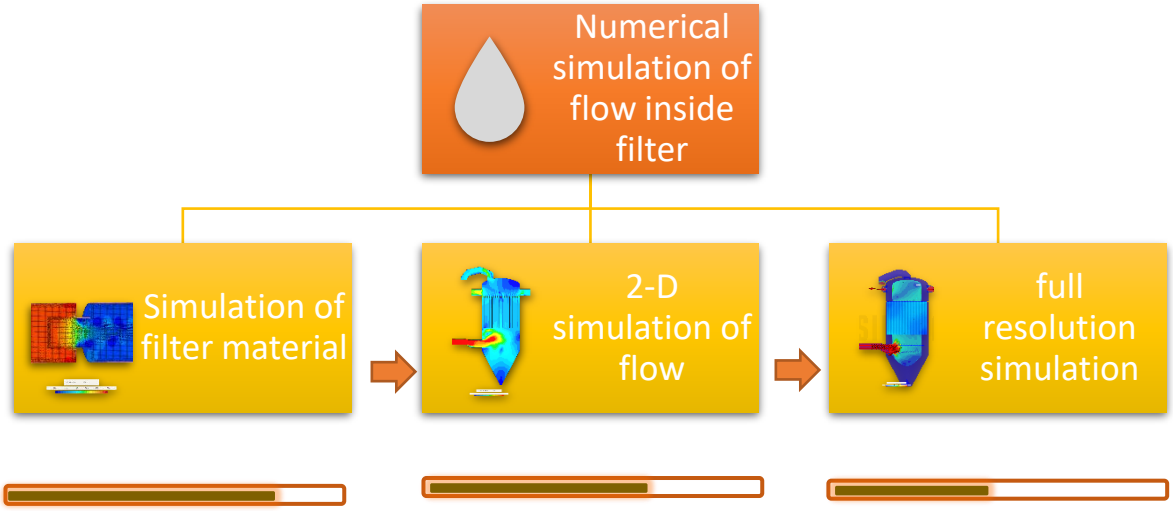
Sunday, December 19, 2021



Aim	To find out appropriate approximation to model porosity of filter martial	To optimize meshing Reduce simulation complexity To get idea of pressure and velocity range across domain	Get full resolution of flow Change design configuration and observe changes in flow Identify low pressure zones to prohibit moisture formation inside the body
Current progress	Treating filter as perforated plate at higher density of air gives correct pressure drop	Simulation using perforated plate model are done	Simulation using thicker filter material and lower time steps done.
Challenge	Pressure drop at lower density is very low. Using other models (darcy-forschheimer) needs more details about material. Which are not available.		Few ways to validity of simulated model to real.

Density @ 80 C and 200Pascal.

(ν) Kinematic viscosity	1.529e-5	m²/s
(ρ) Density	2.98e-3	kg/m³

Filter material Advance concept

Porous media	Perforated plate	
Plate data		
Free area ratio	0.5	
Hole shape	General	
Flow direction		
x	1	m
y	0	m
z	0.5	m

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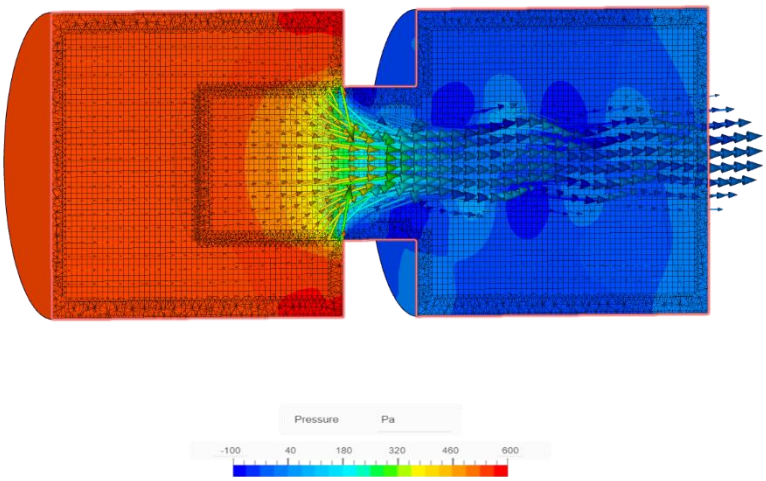
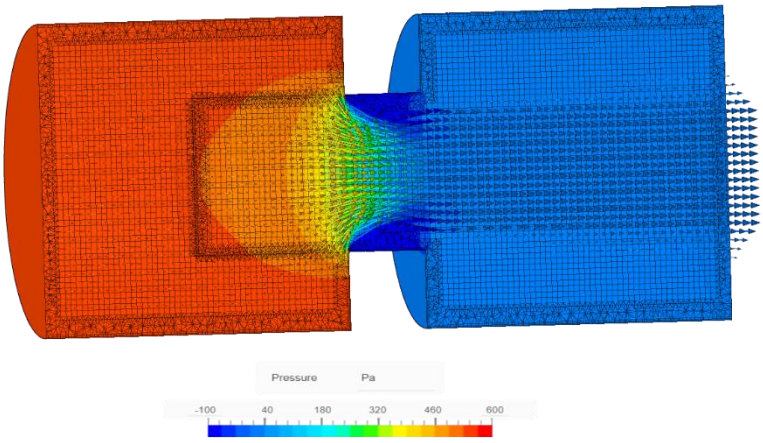
Filter Material simulation

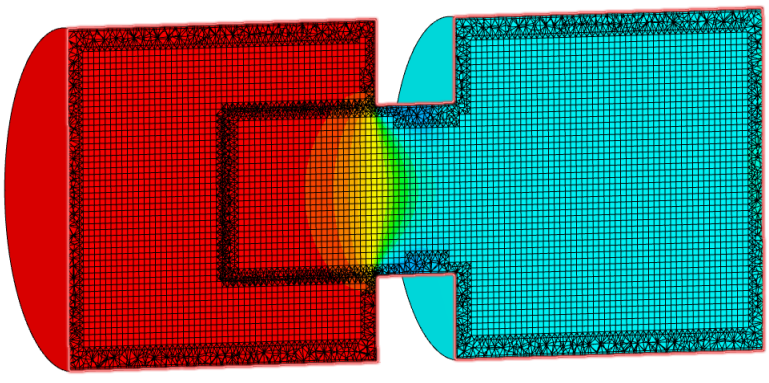
1. With 1kg/m3 density porosity 50%



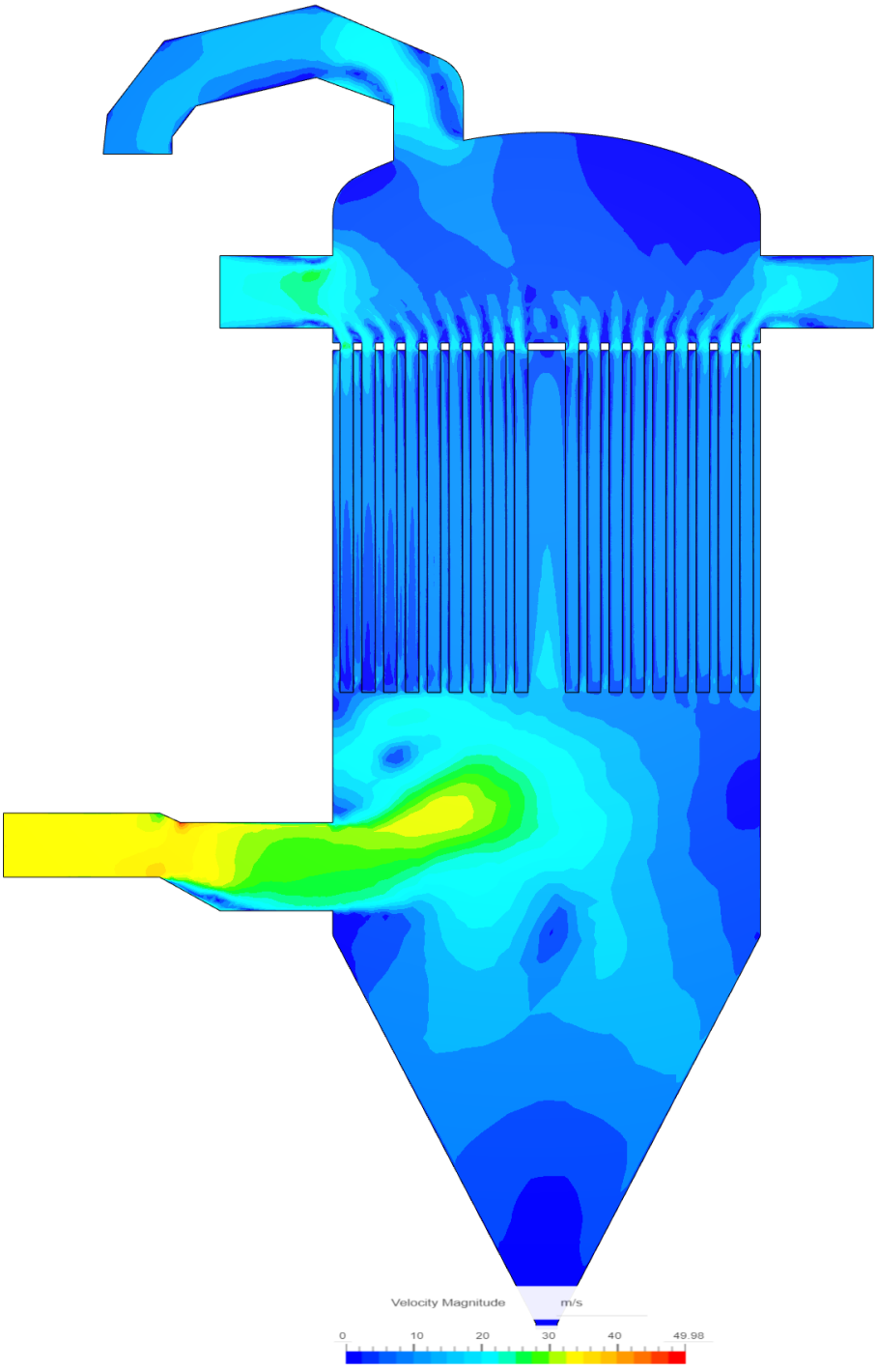
2. With 1kg/m3 density porosity 70%



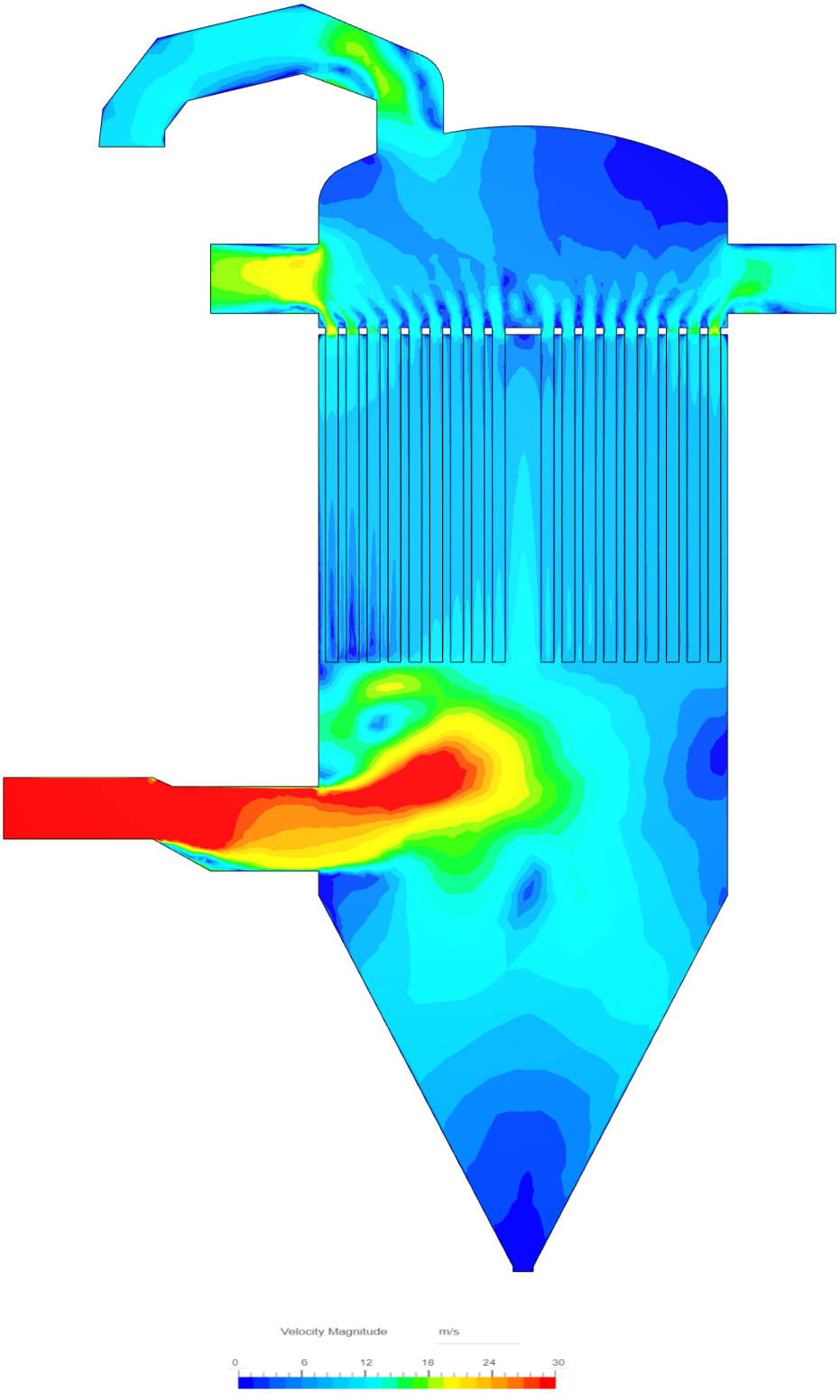
3. With 0.003kg/m3 porosity 75%



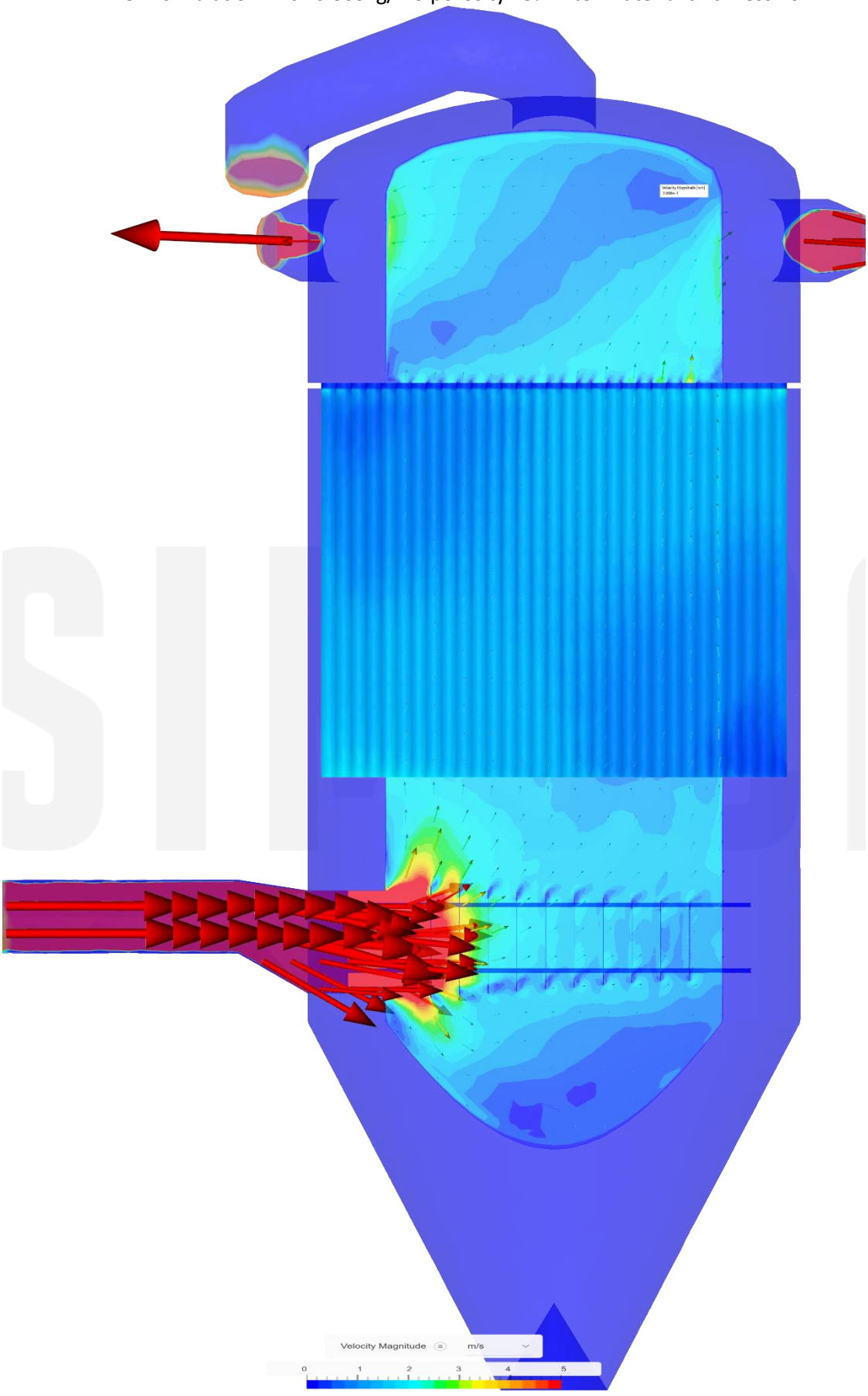
4. 2-D simulation With 0.003kg/m3 porosity 30%

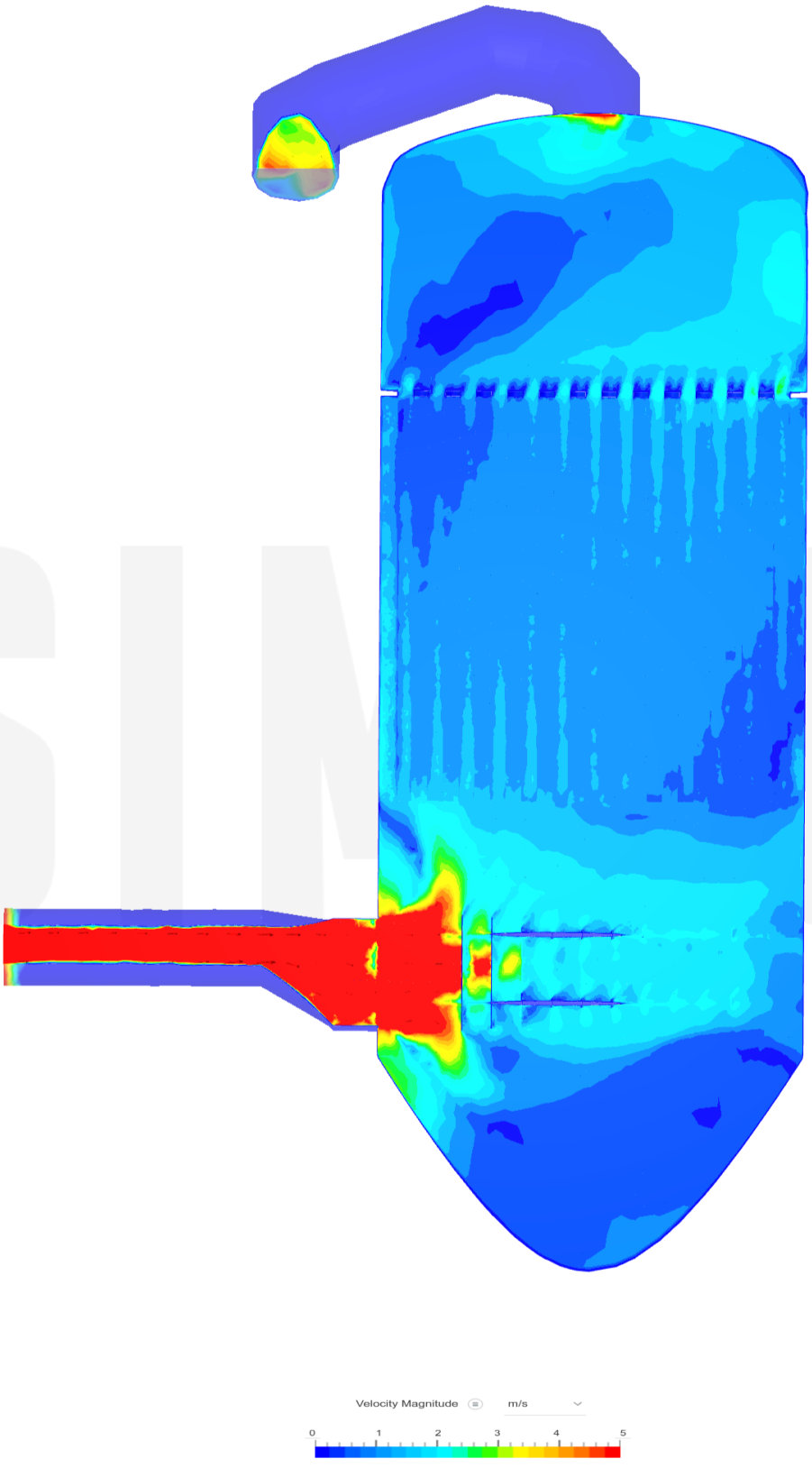


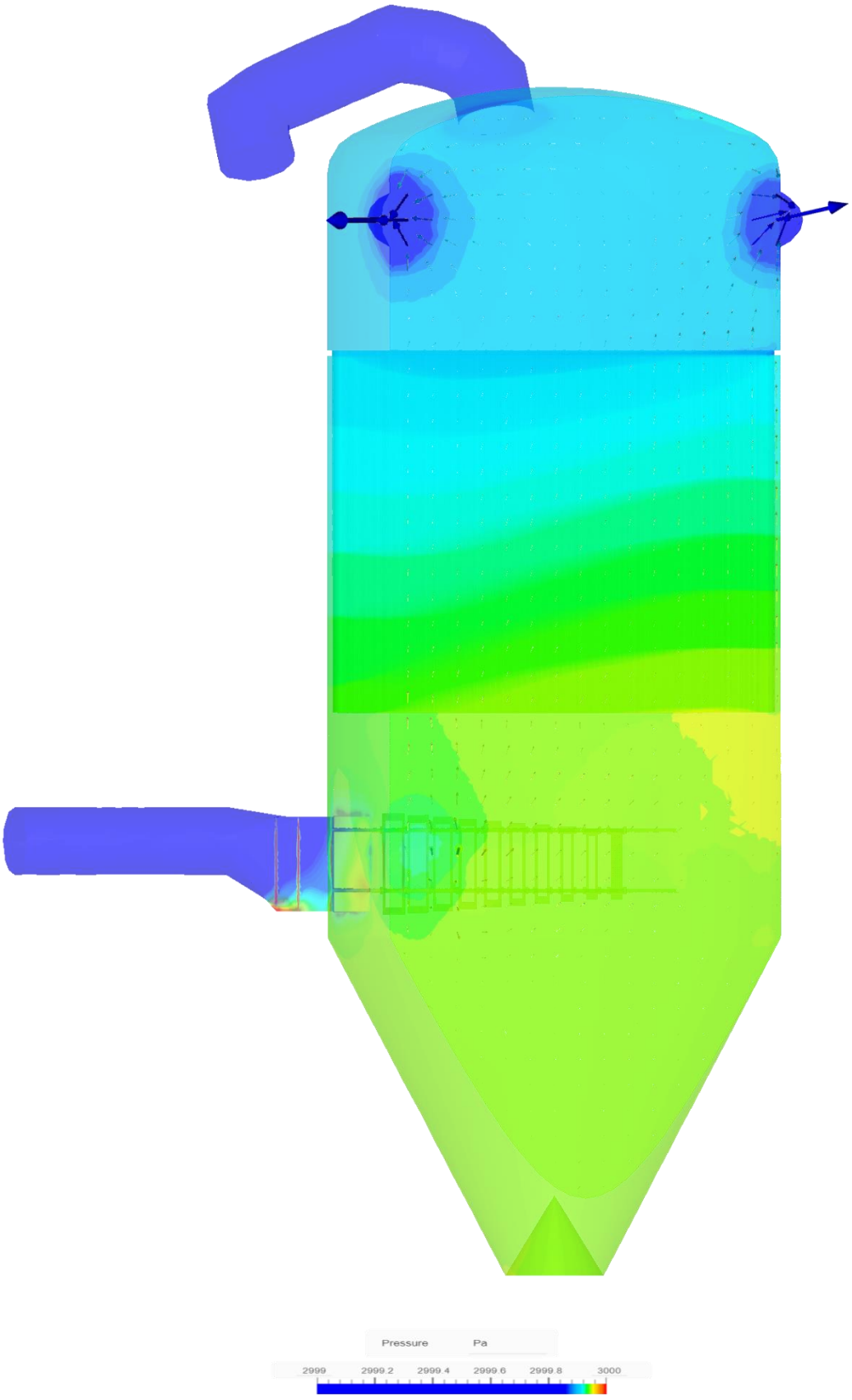
5. 2-D simulation With 0.003kg/m3 porosity 75%



3-D simulation With 0.003kg/m3 porosity 75% filter material thickness 10mm




Velocity Magnitude
m/s
0
1
2
3
4
5


Pressure
Pa
2999
2999.2
2999.4
2999.6
2999.8
3000