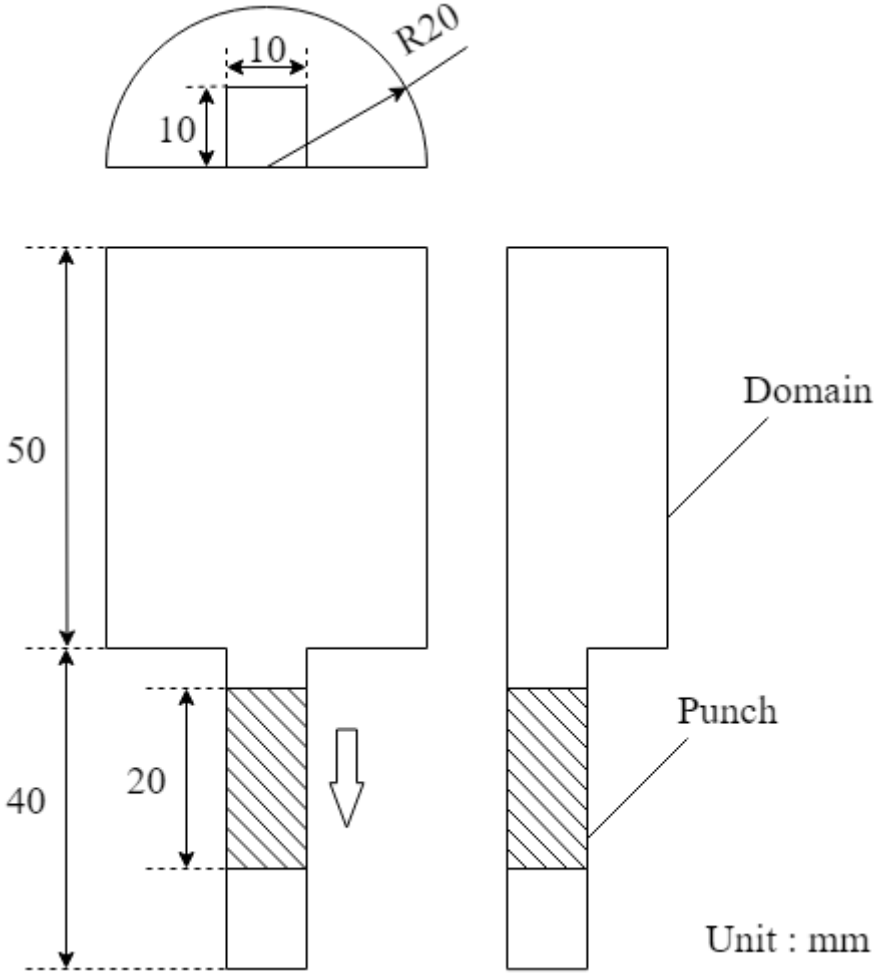

Figure 1. Schematic Geometry

Table 1. Physical Properties

Gas phase	
Viscosity	1.8×10^{-5} Pa・s
Density	1 kg/m^3
Solid phase	
Density	1500 kg/m^3
Spring constant	50 N/m
Coefficient of restitution	0.9
Coefficient of friction	0.3

Table 2. Calculation conditions

Particle diameter	250 μm
Number of particles	500,000
Grid size	0.5 mm
Calculation time	0.24 s

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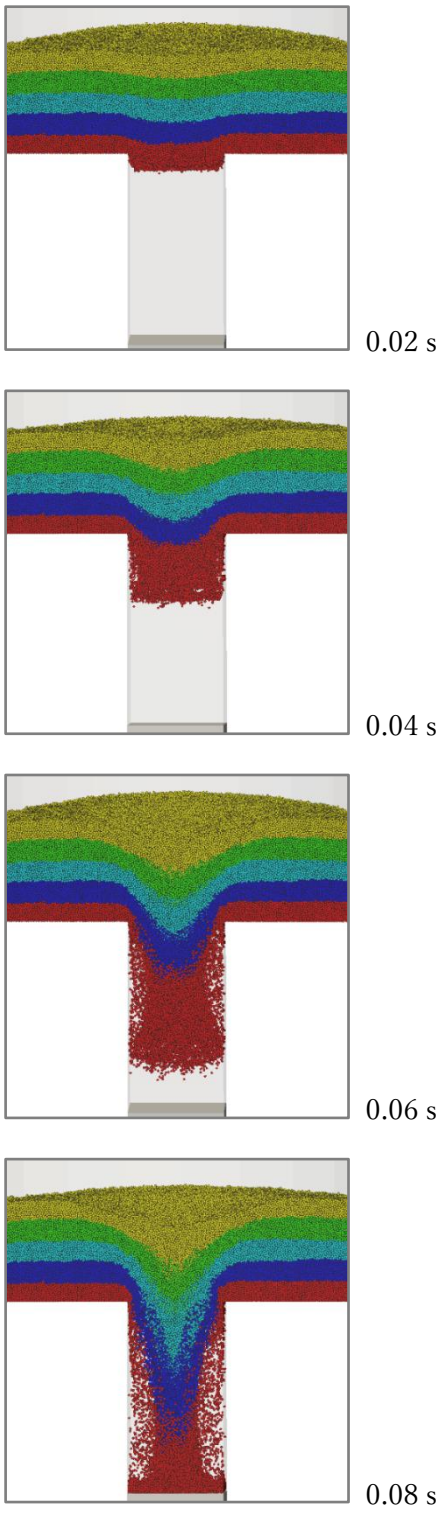

Figure 2. Particle distribution

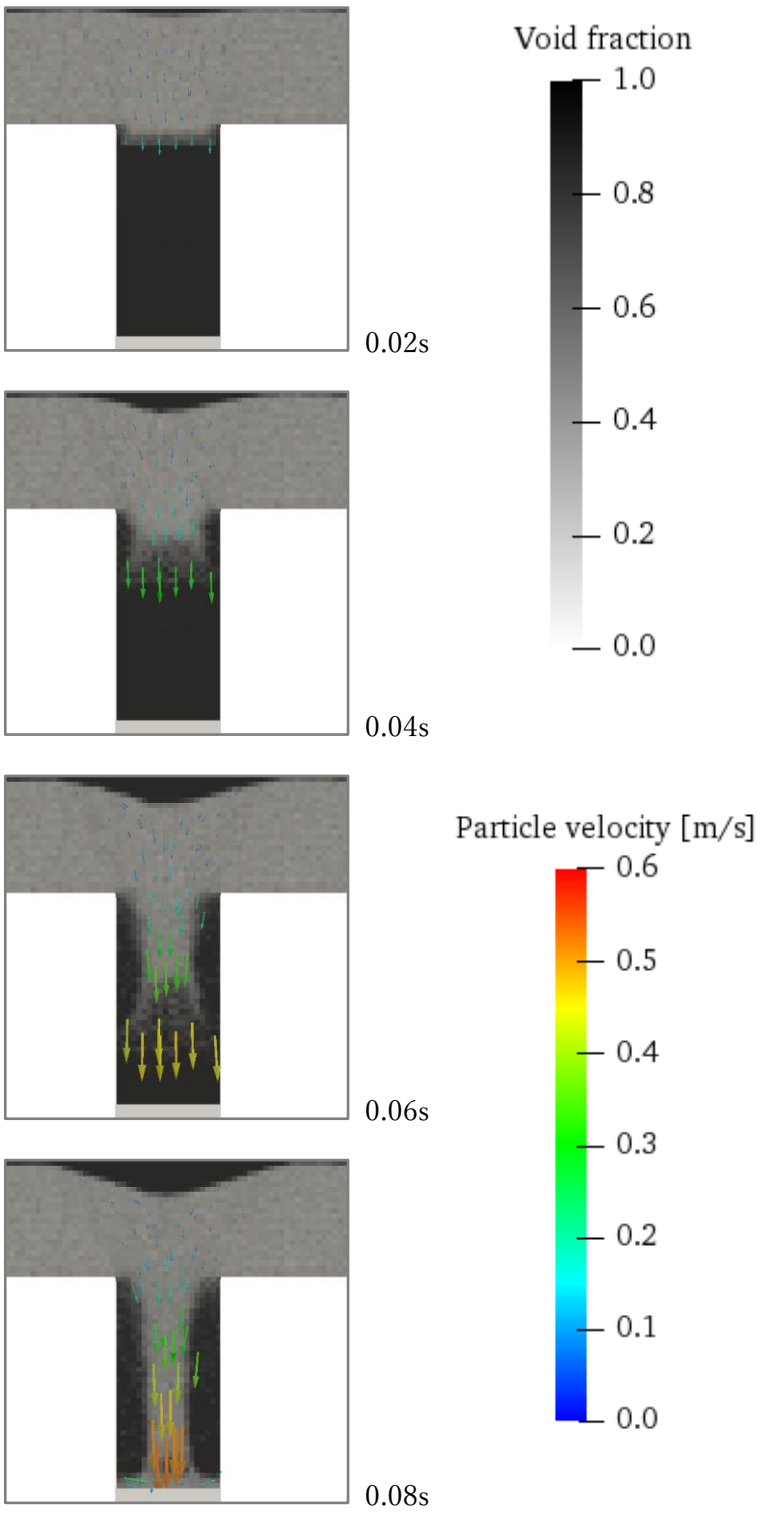

Figure 3. Particle velocity and void fraction rate

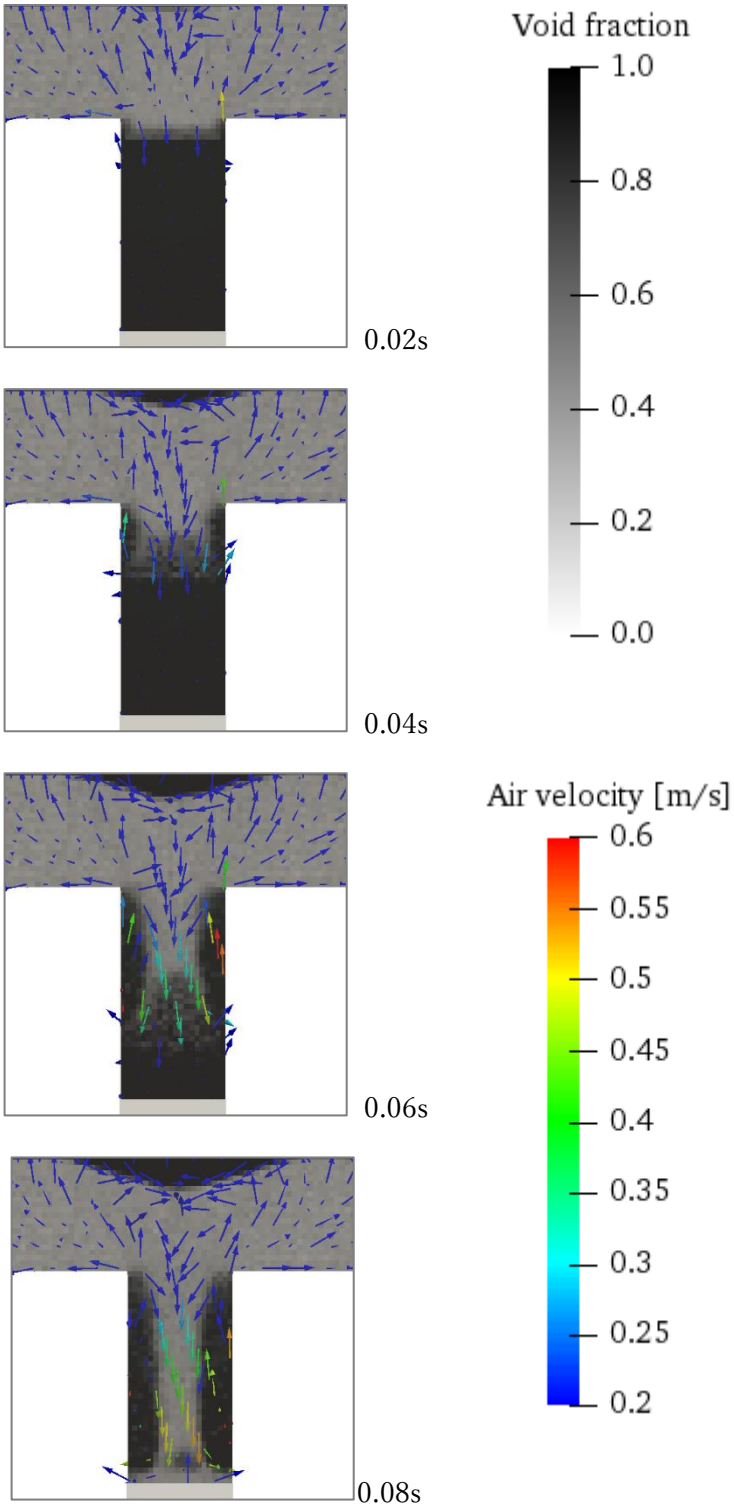

Figure 4. Air velocity and void fraction rate

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下杵降下速度 100, 300, 500, 700 [mm/s]

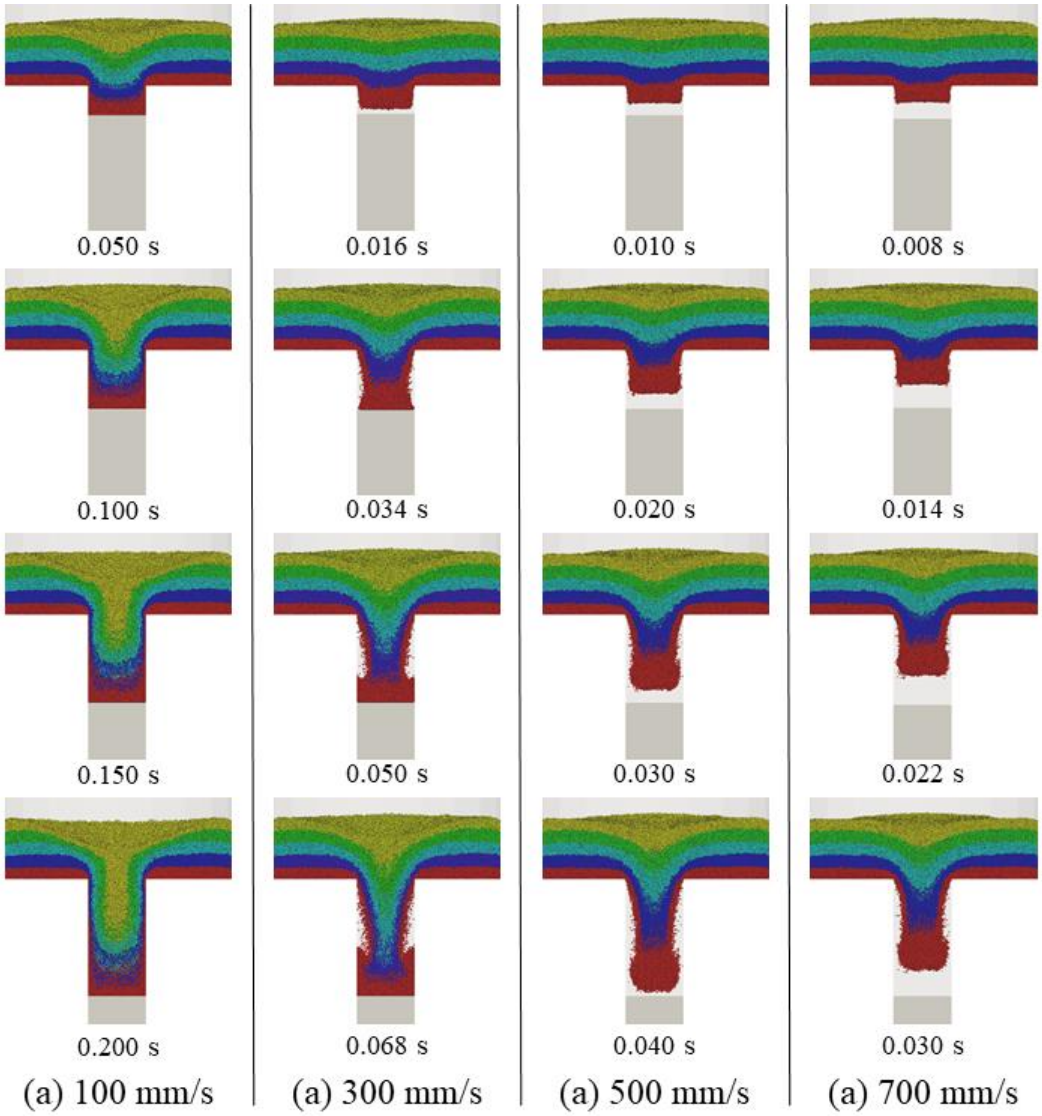

Figure 5. Particle distribution

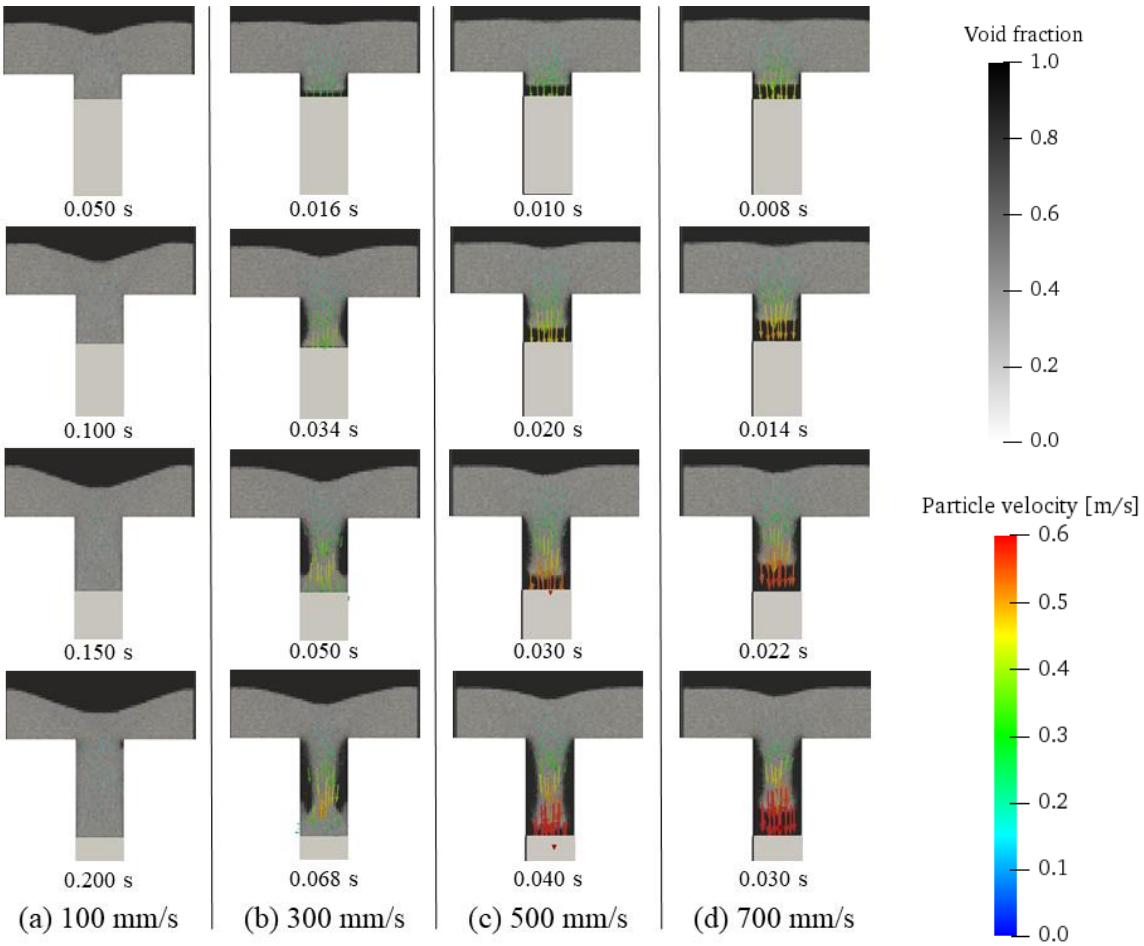

Figure 6. Particle velocity and void fraction rate

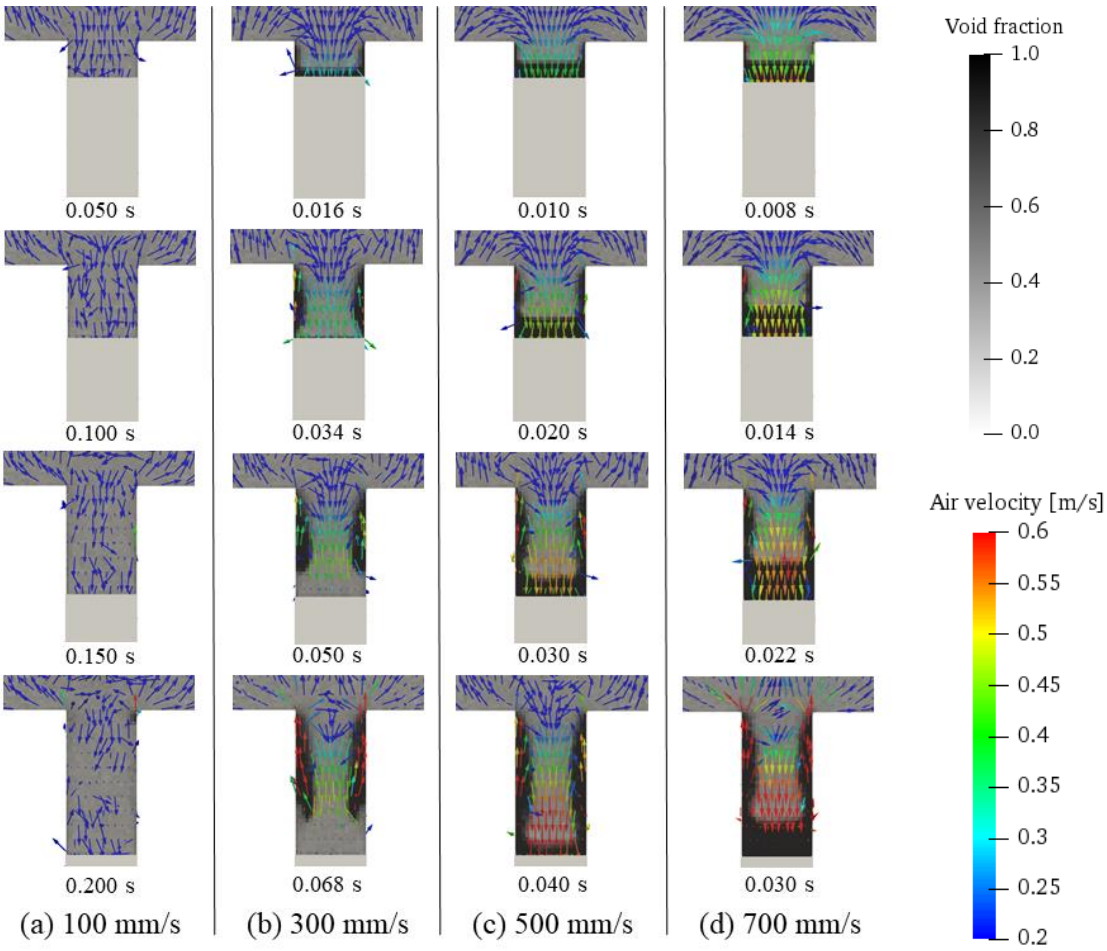

Figure 7. Air velocity and void fraction rate

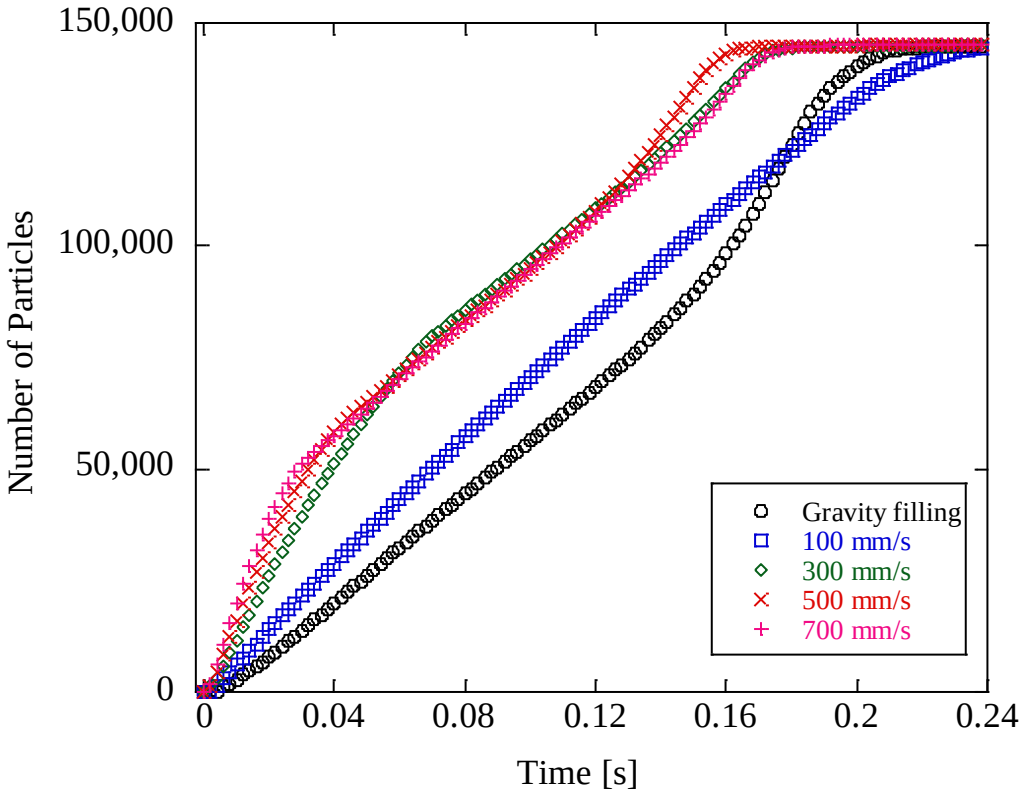

Figure 8. Number of particles in die region

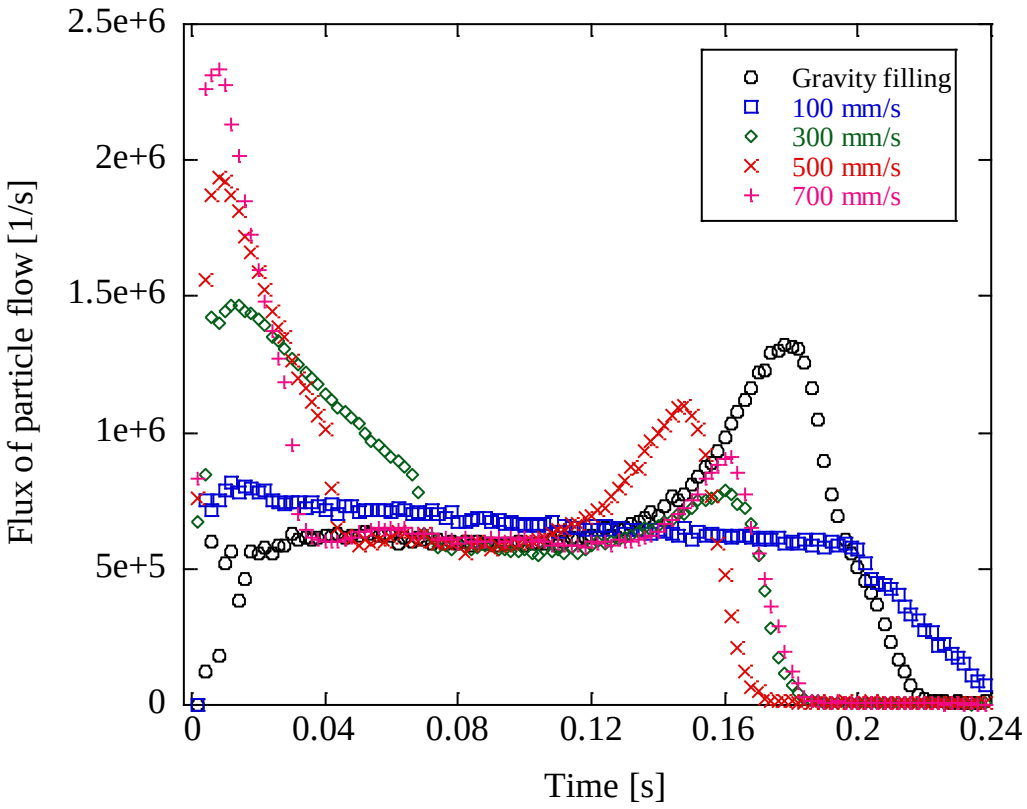

Figure 9. Flux of powder flow

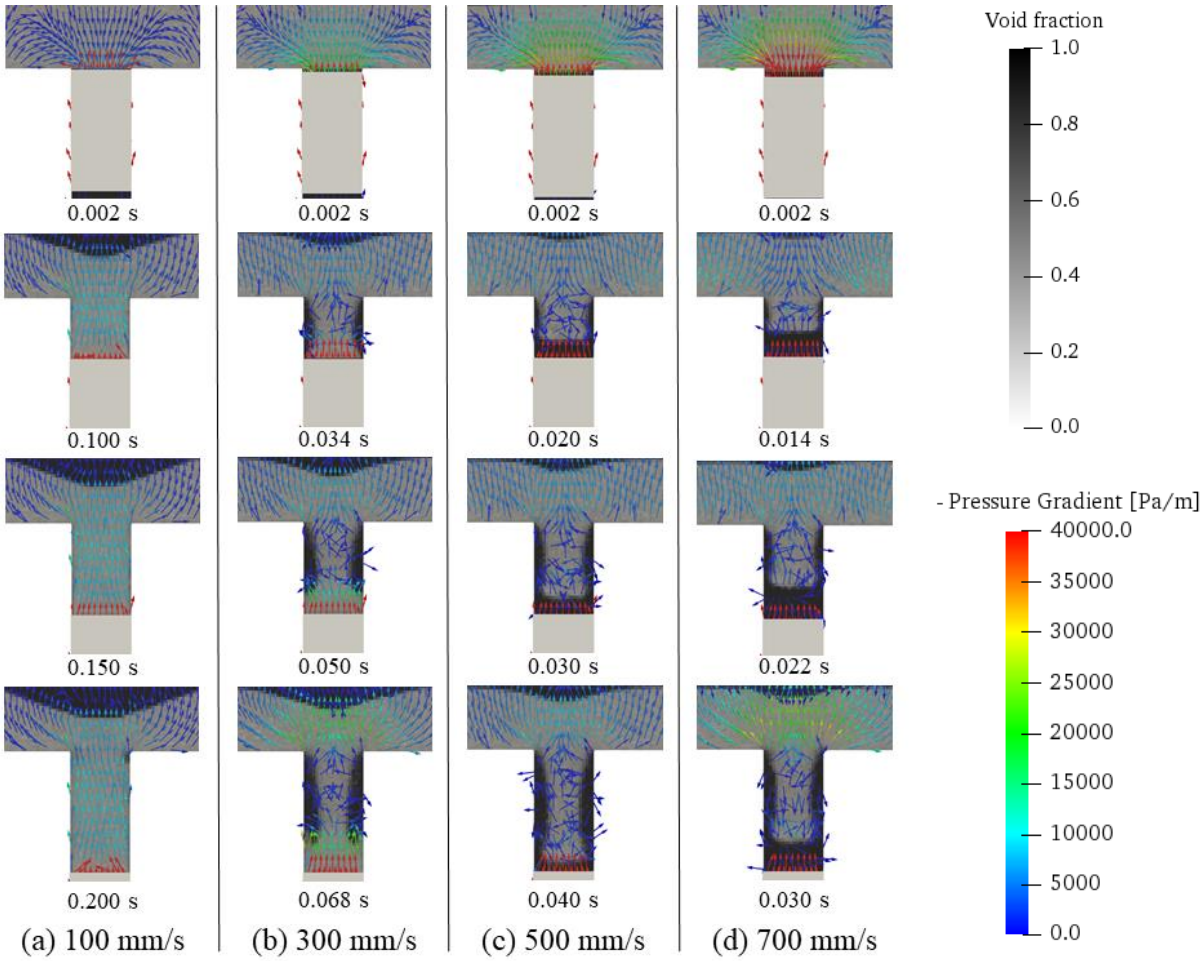

Figure 10. Pressure gradient

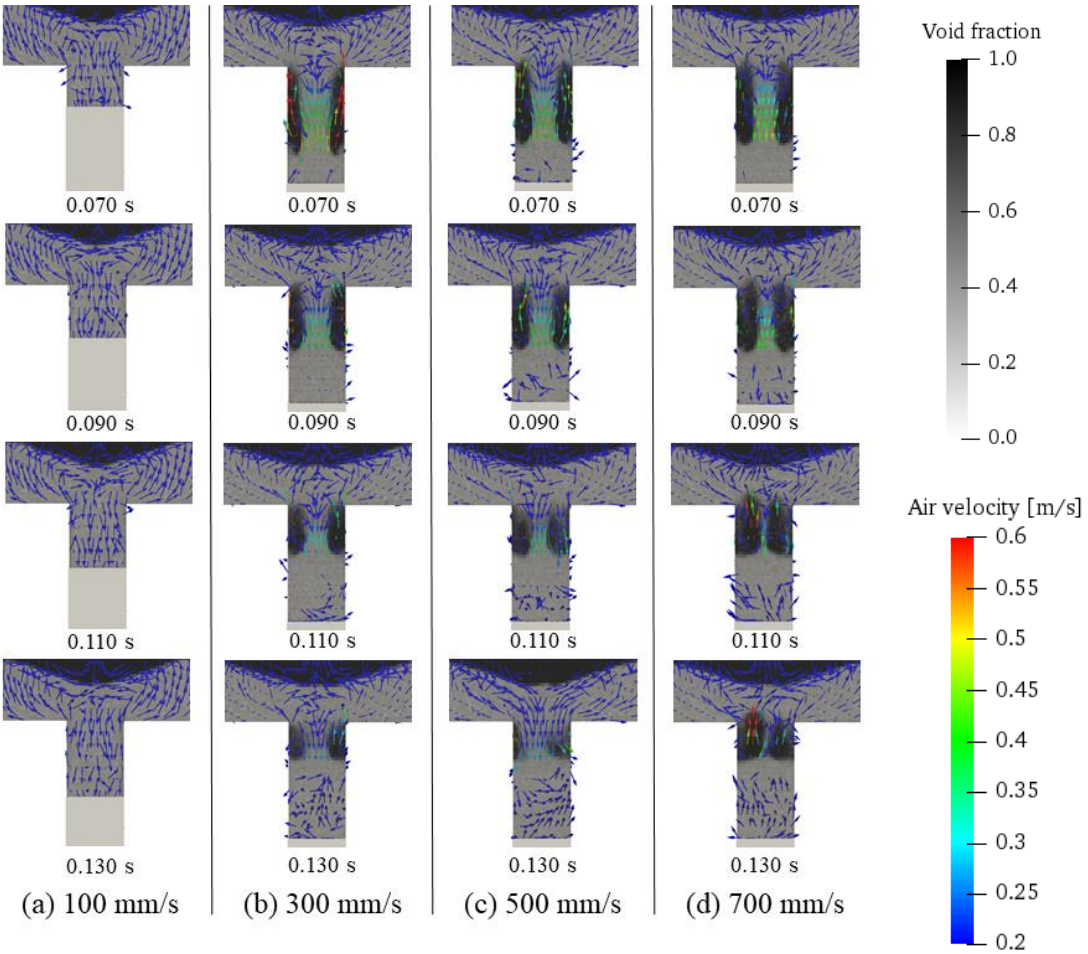

Figure 11. Bubble velocity

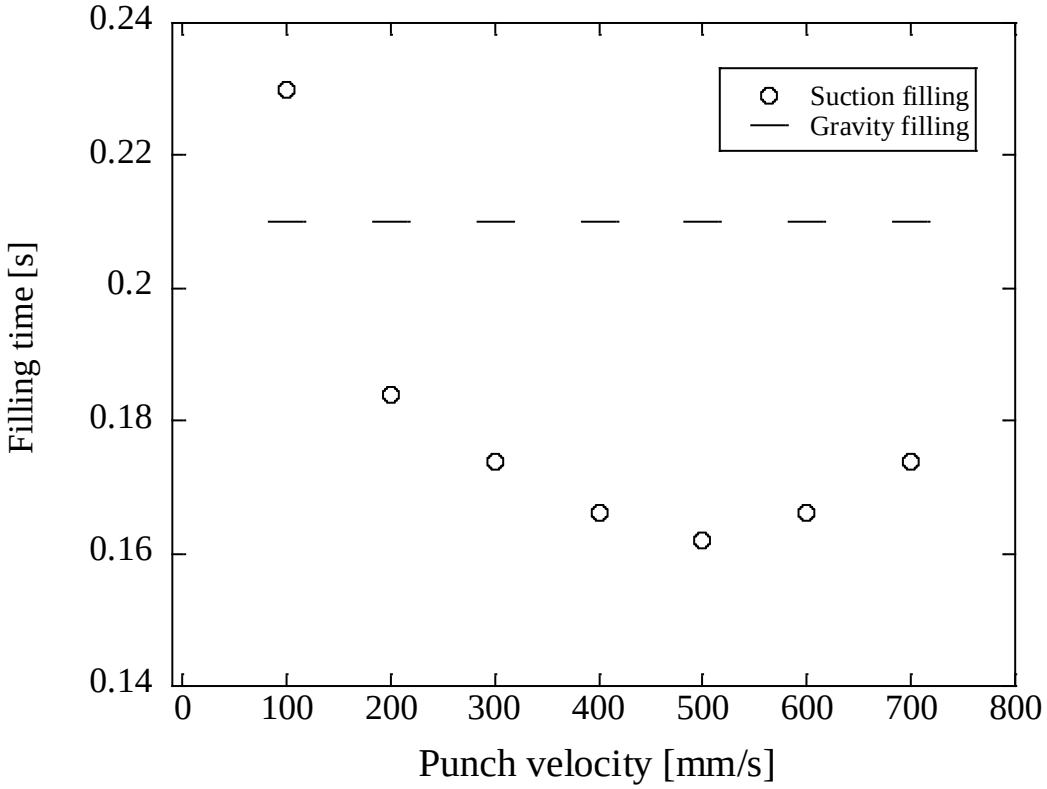

Figure 12. Filling time