

Figure 1. Schematic diagram

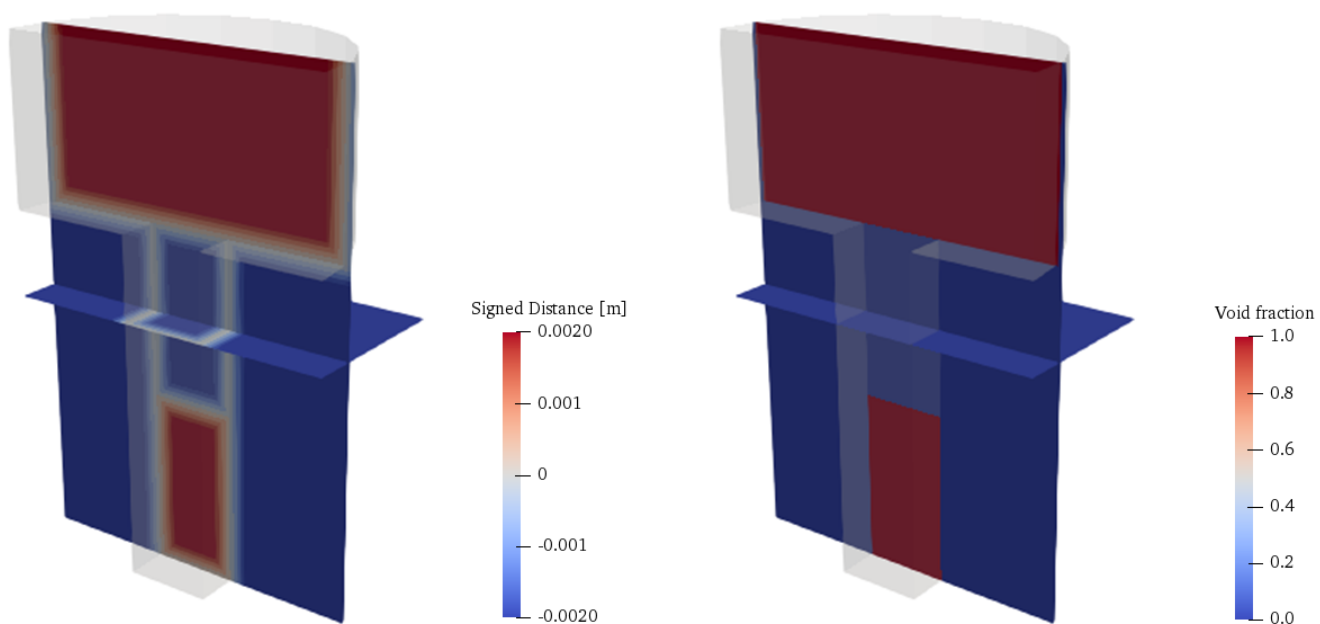


Figure 2. SDF and IBM

Table 1. Physical properties

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

Table 2. Calculation conditions

Particle diameter	$250 \text{ }\mu\text{m}$
Number of particles	500,000
Grid size	$0.5 \text{ mm}$
Calculation time	$0.24 \text{ s}$

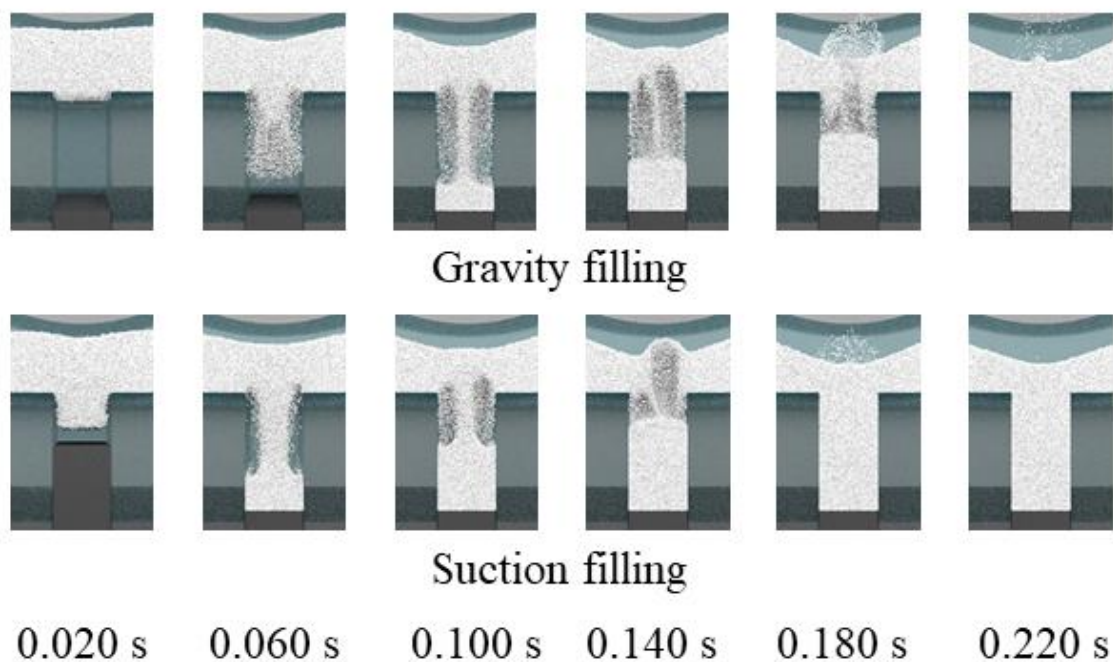


Figure 3. Powder distribution  
In case suction filling, the punch speed was 500 mm/s.

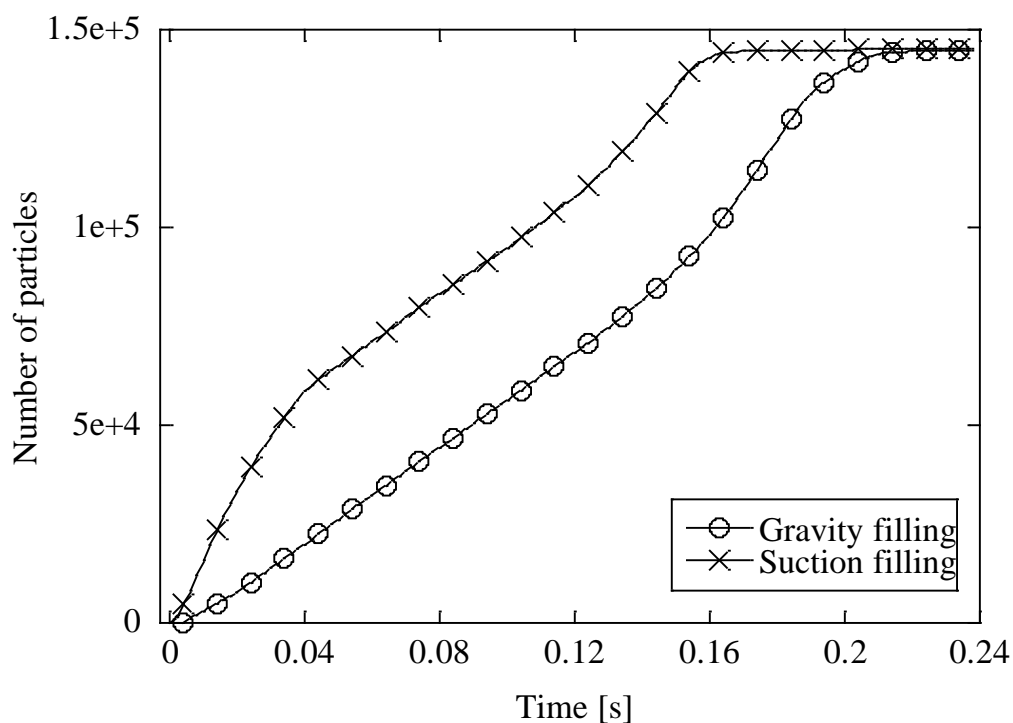


Figure 4. Number of particles in die region

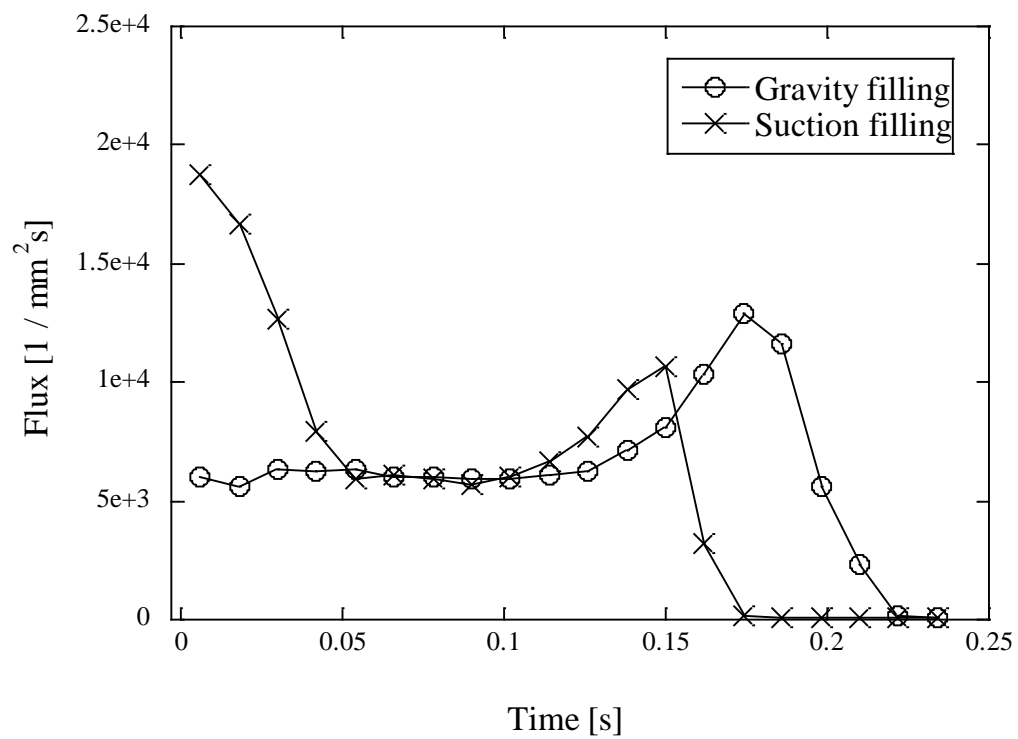


Figure 5. Flux of powder into die region

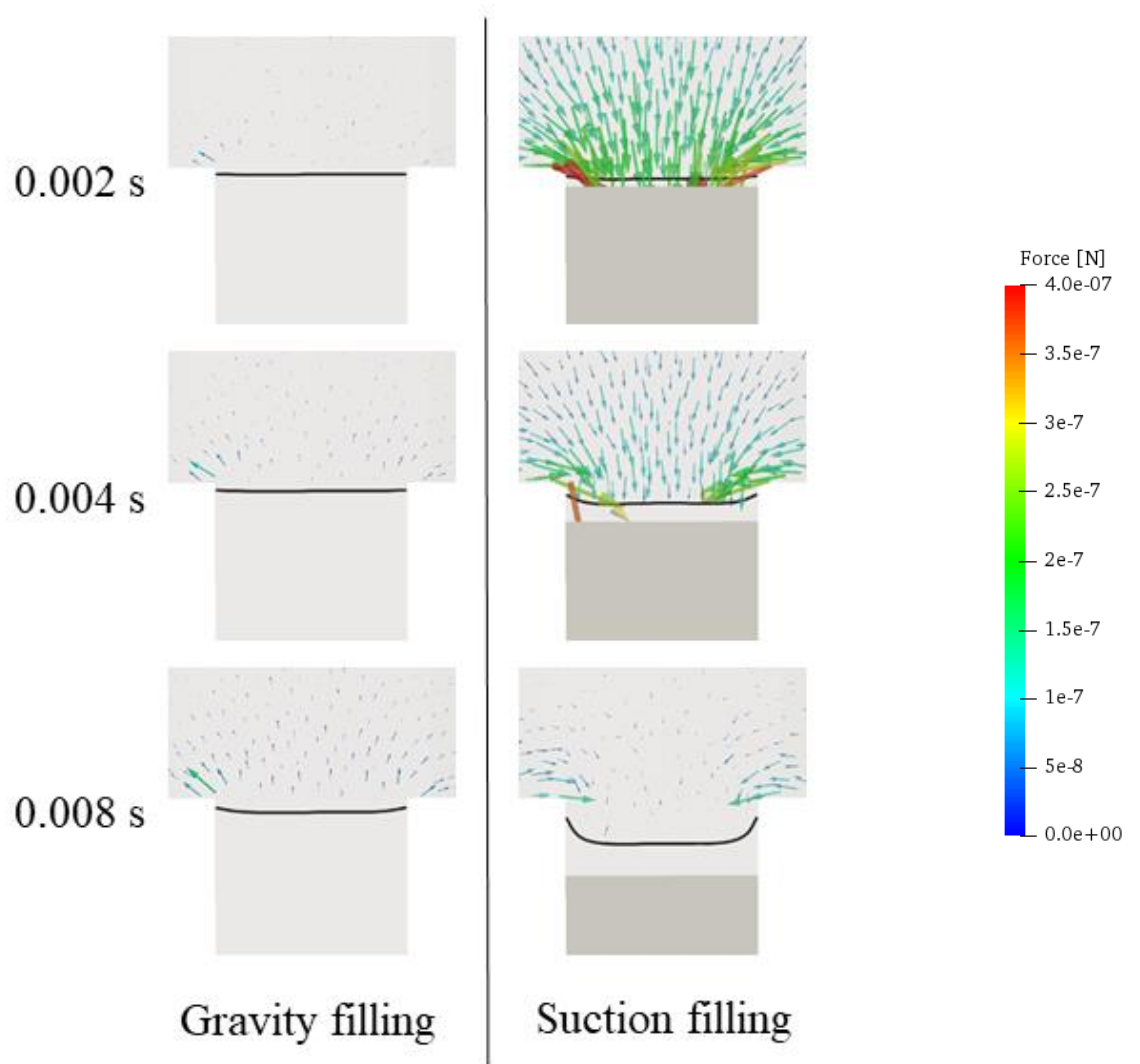


Figure 6. Drag force

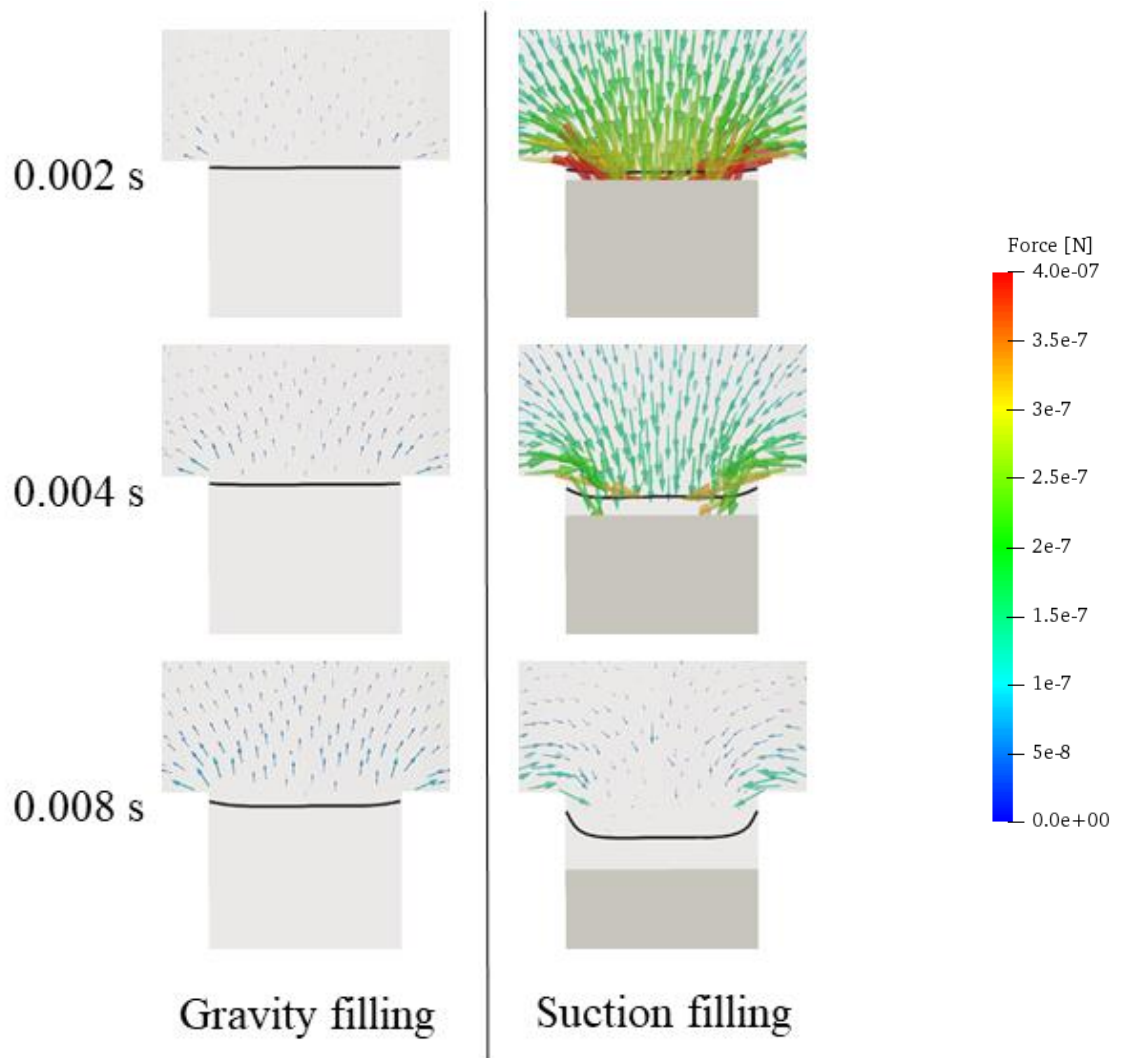


Figure 7. Pressure force

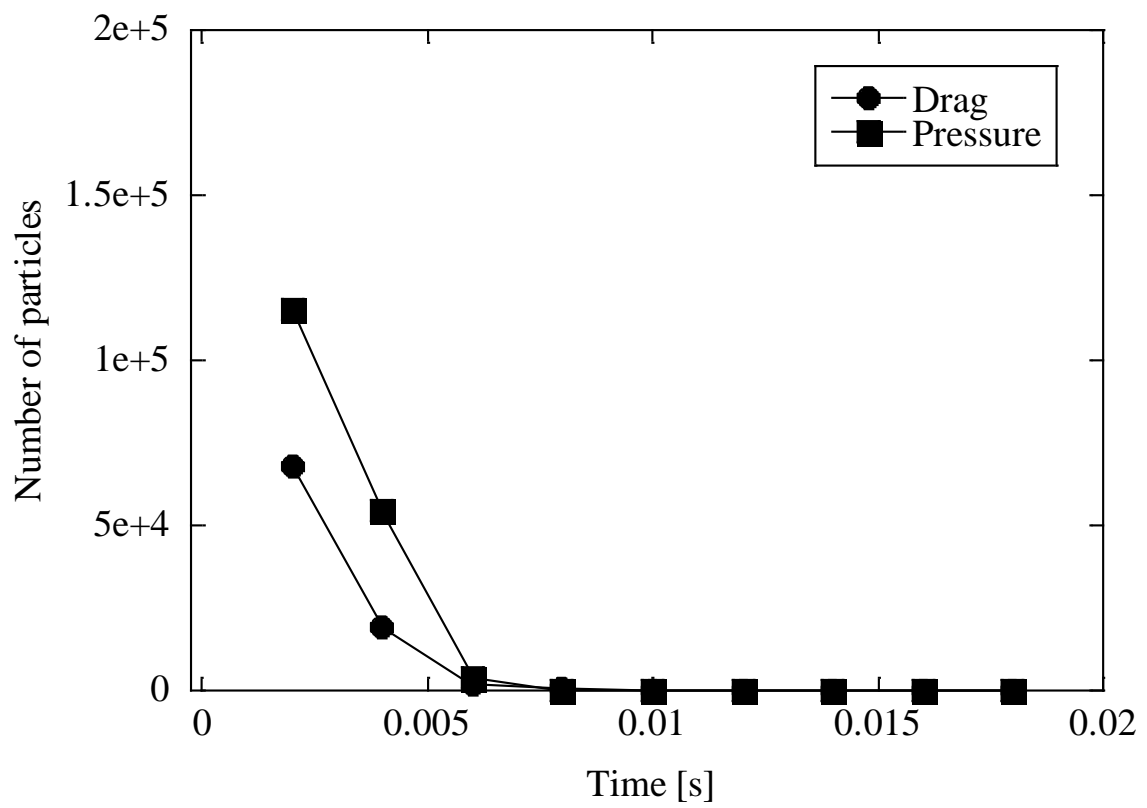


Figure 8. Number of suctioned particles



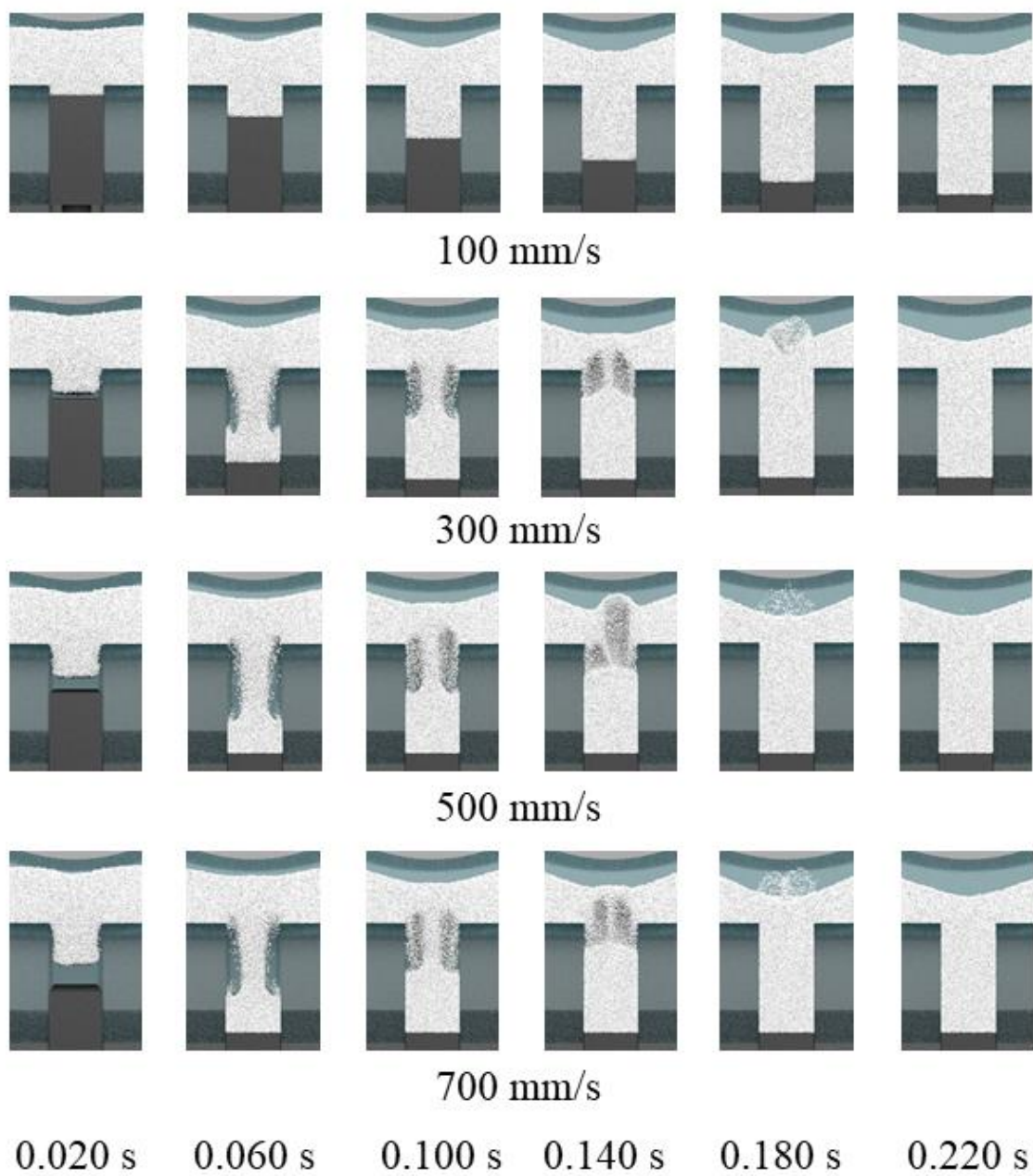


Figure 9. Powder distribution

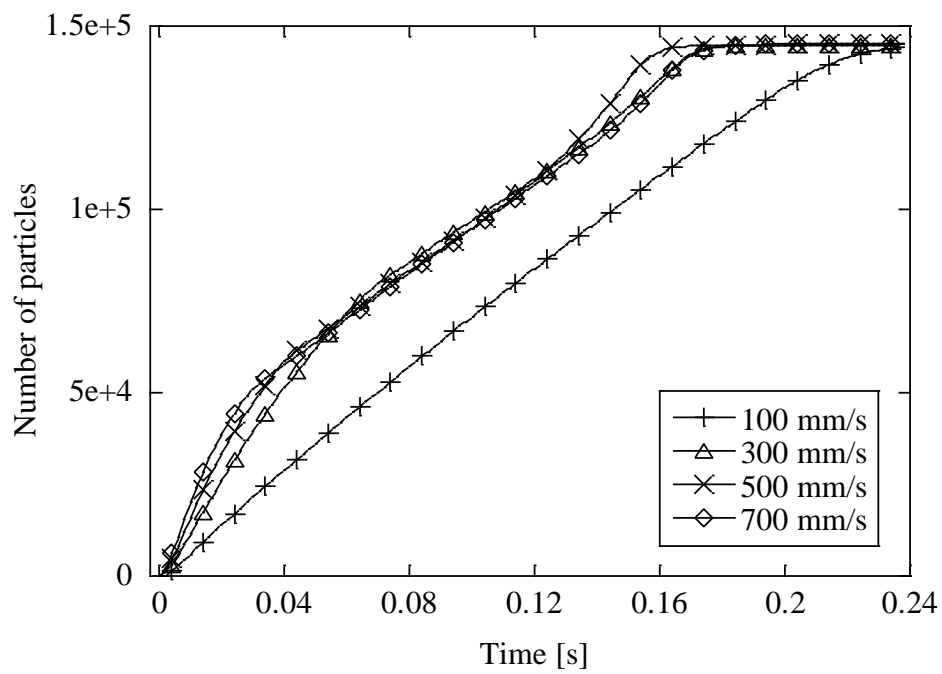


Figure 10. Number of particles in die region

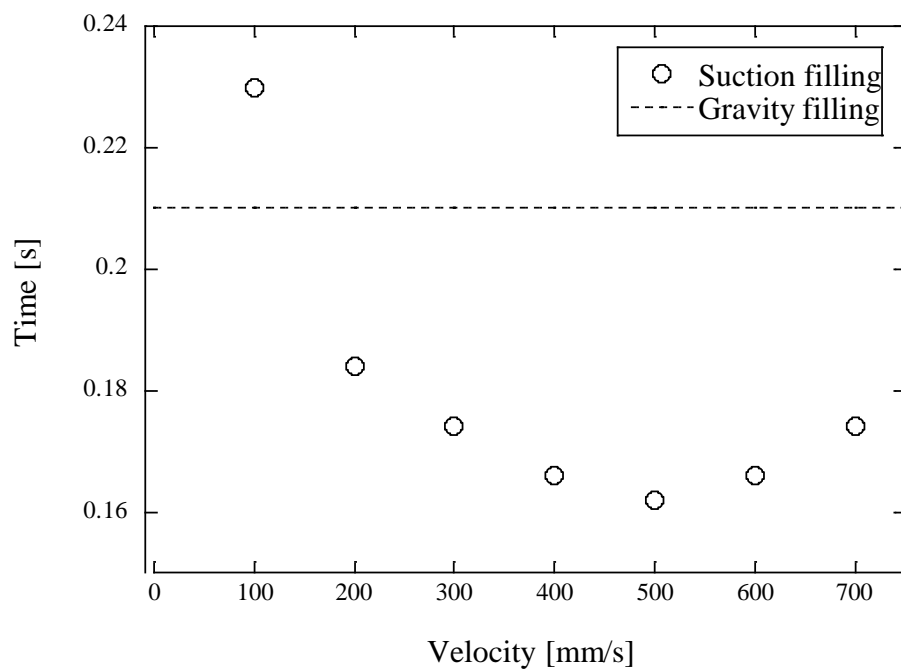


Figure 11. Filling time

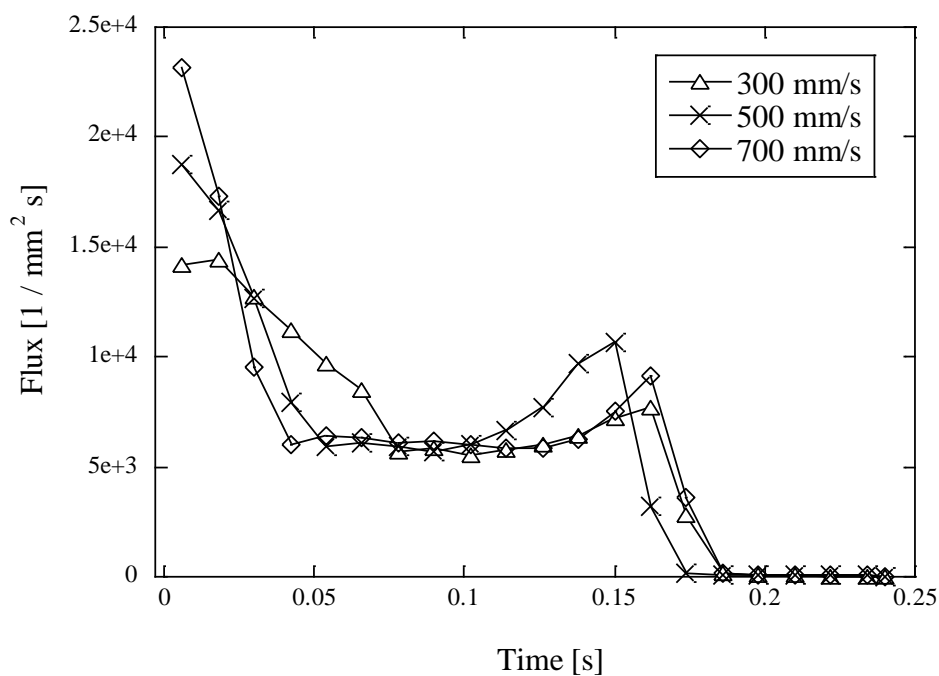


Figure 12. Flux of powder into die region

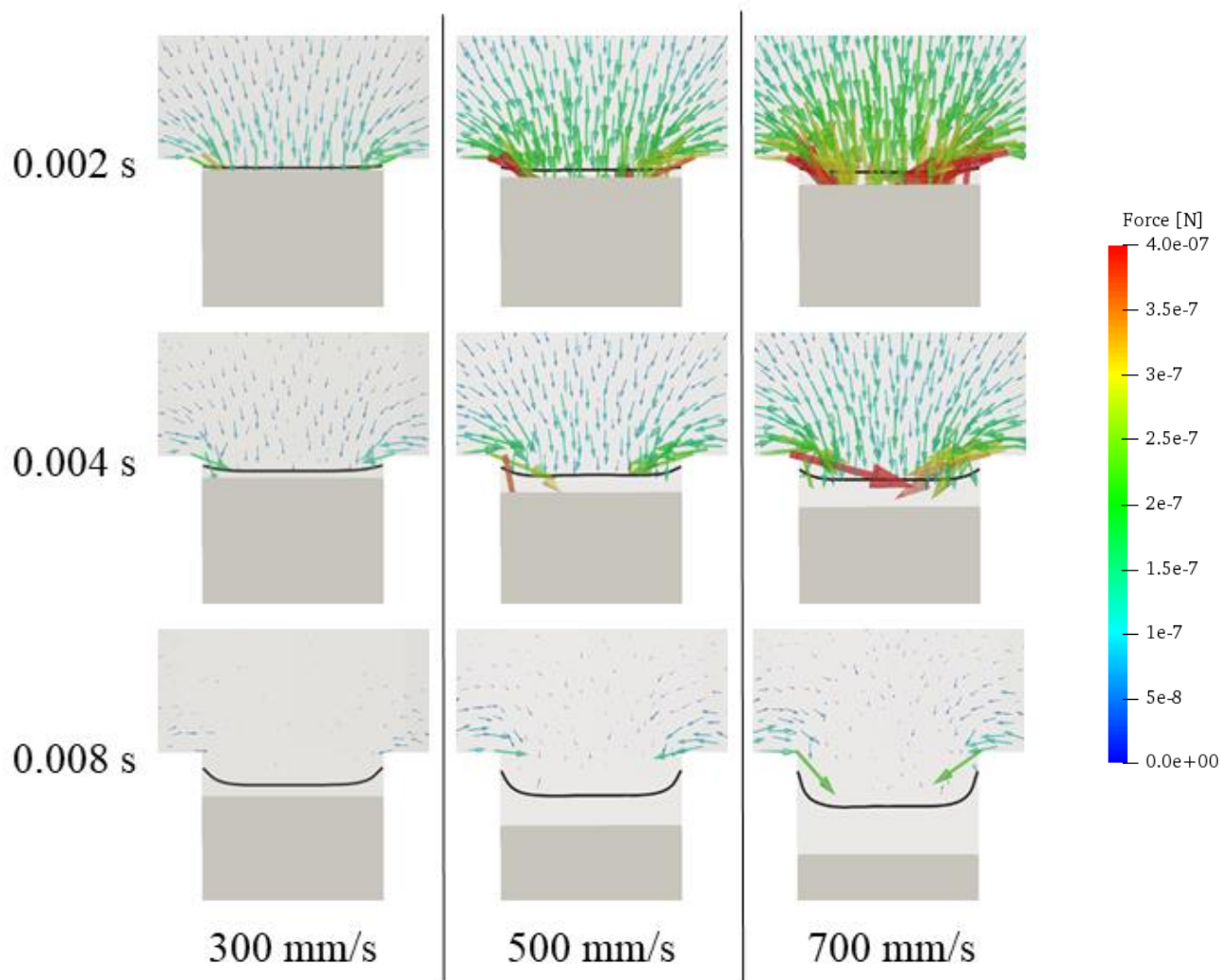


Figure 13. Drag force

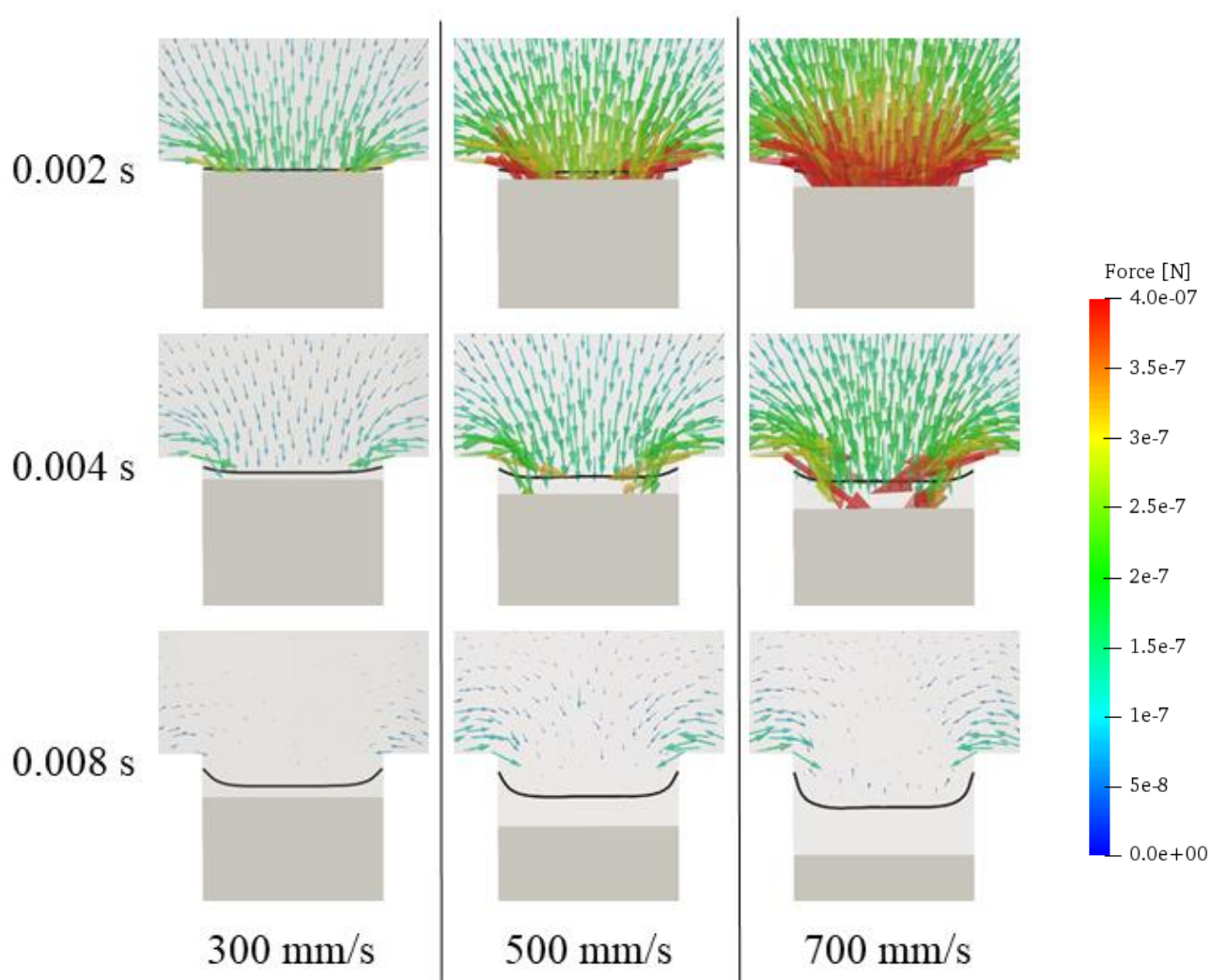


Figure 14. Pressure force

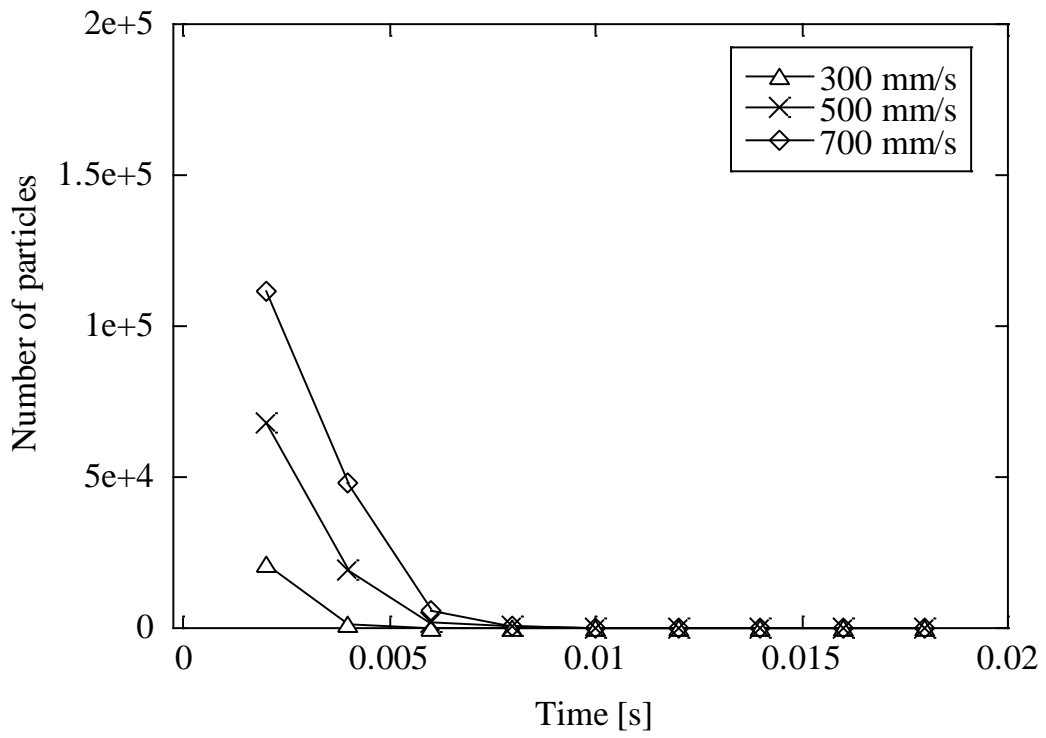


Figure 15. Number of suctioned particles by drag force

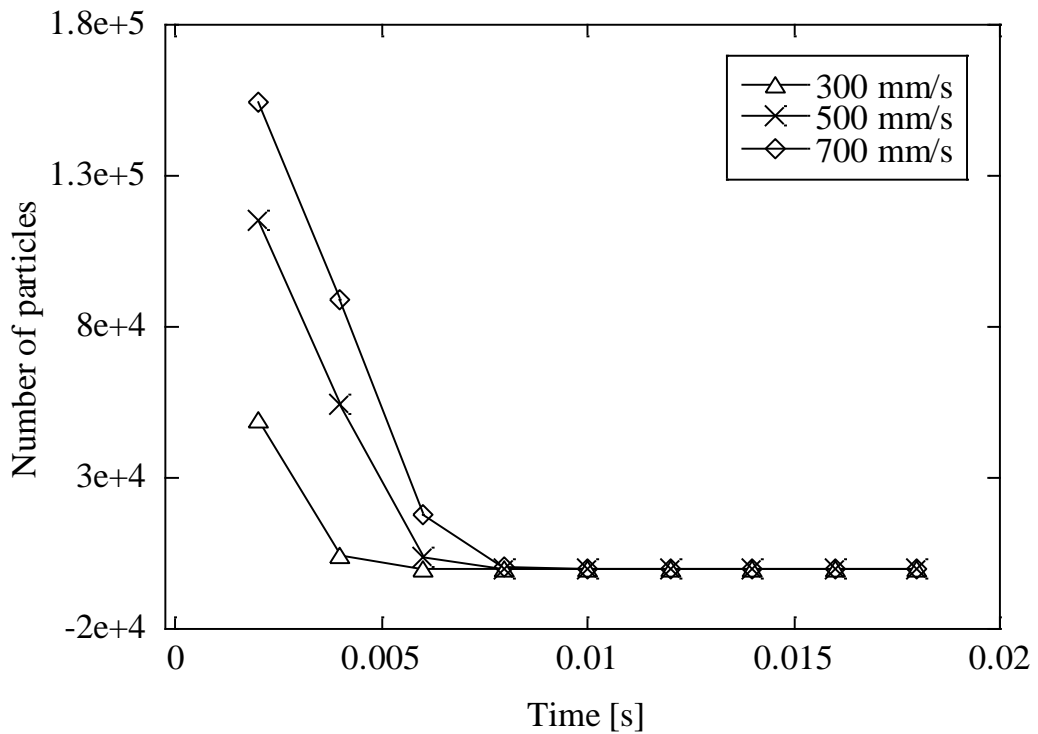


Figure 16. Number of suctioned particles by pressure gradient

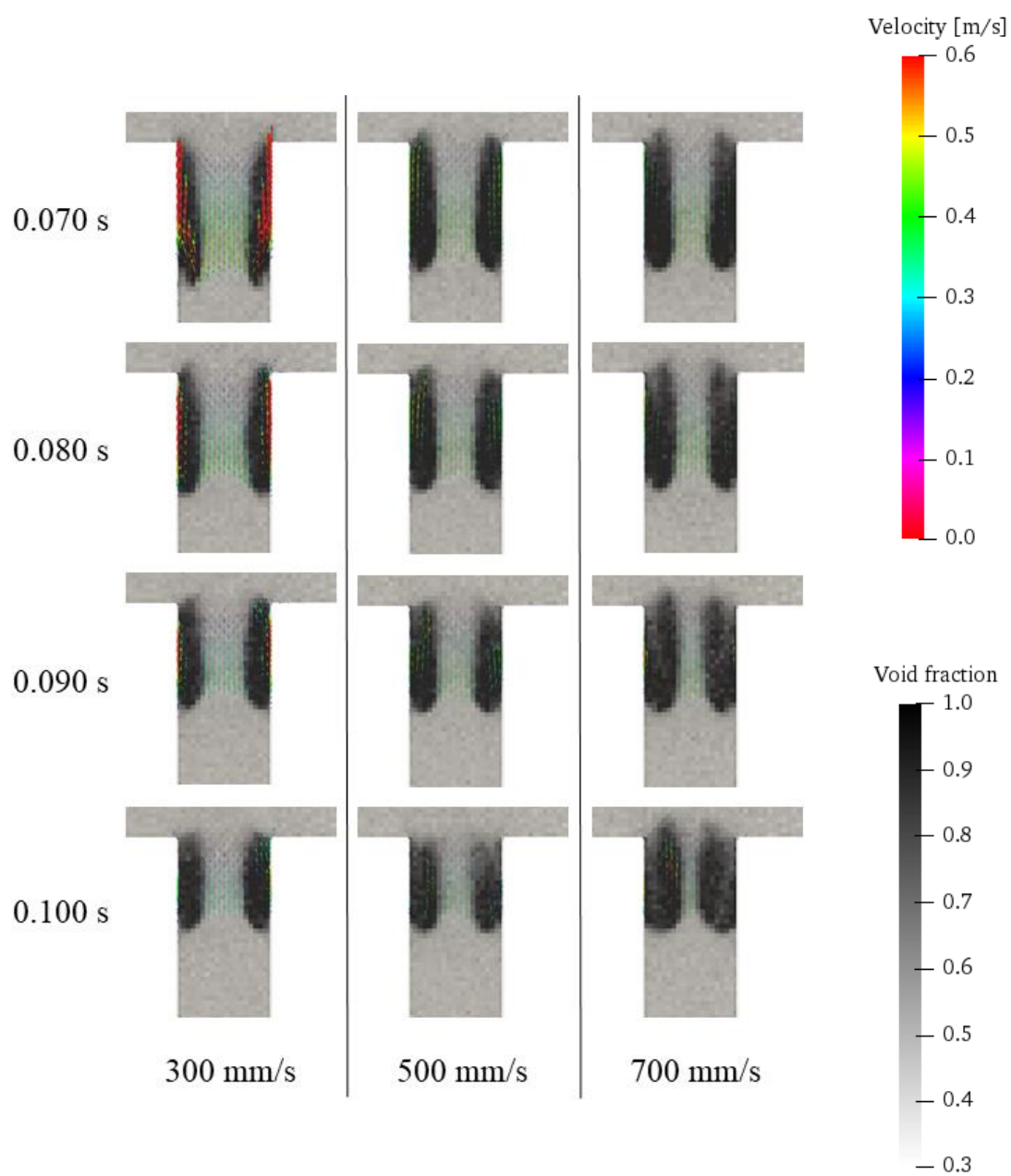


Figure 17. Air velocity