

Figure 1. Schematic Geometry

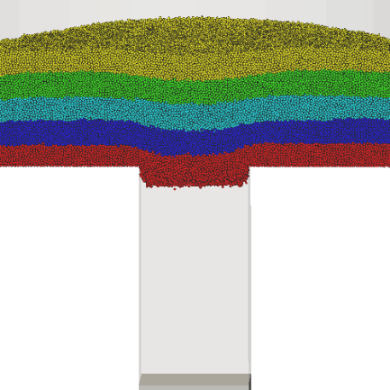
Table 1. Physical Properties

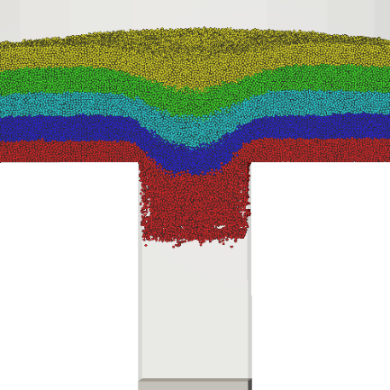
|  |  |
| --- | --- |
| Gas phase |  |
| Viscosity | 1.8×10-5 Pa・s |
| Density | 1 kg/m3 |
| Solid phase |  |
| Density | 1500 kg/m3 |
| Spring constant | 50 N/m |
| Coefficient of restitution | 0.9 |
| Coefficient of friction | 0.3 |

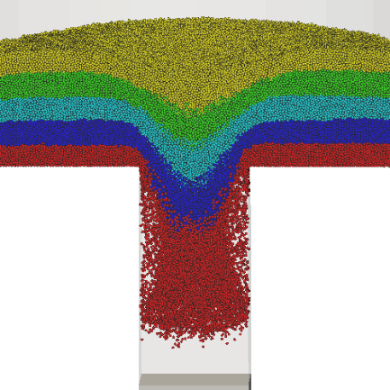
Table 2. Calculation conditions

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

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0.02 s

0.04 s

0.06 s

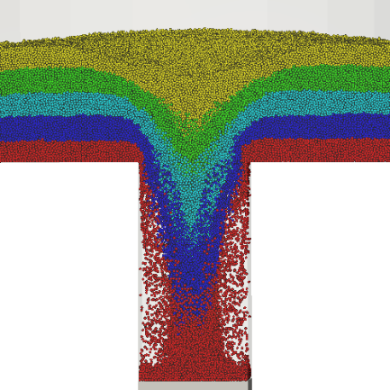
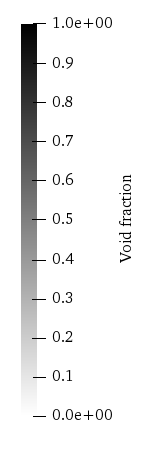
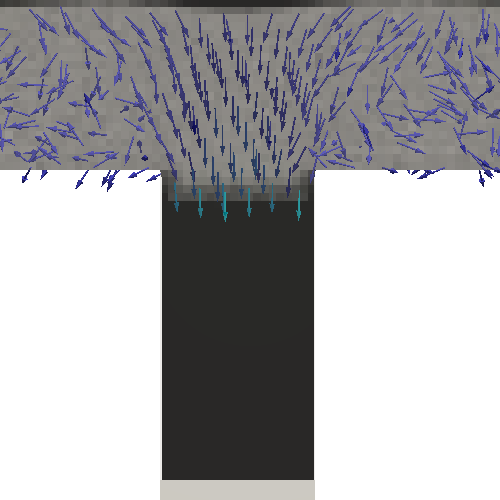
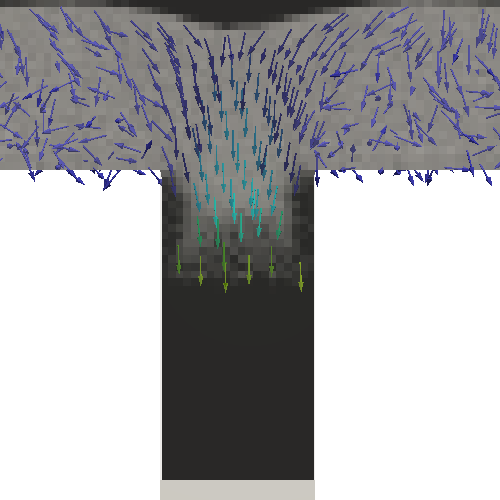
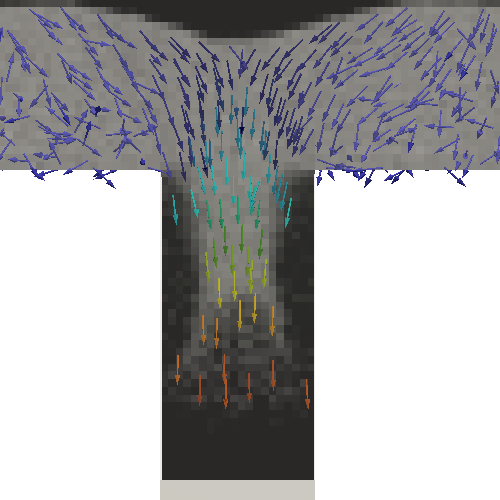
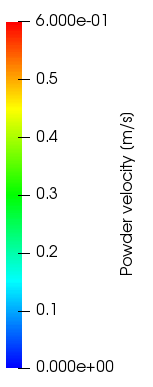
0.08 s

Figure 2. Powder distribution

  0.02s

0.04s



 0.06s

0.08s

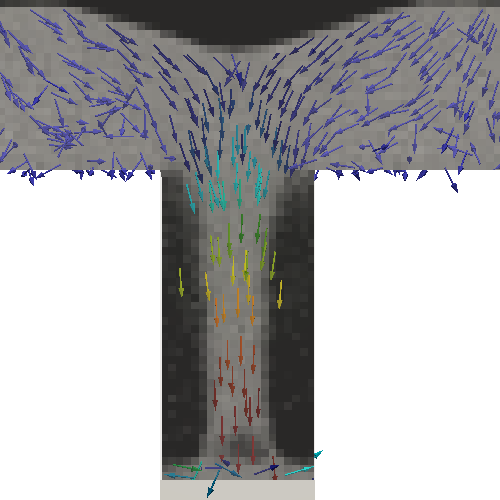
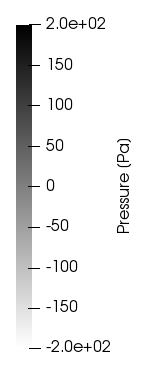
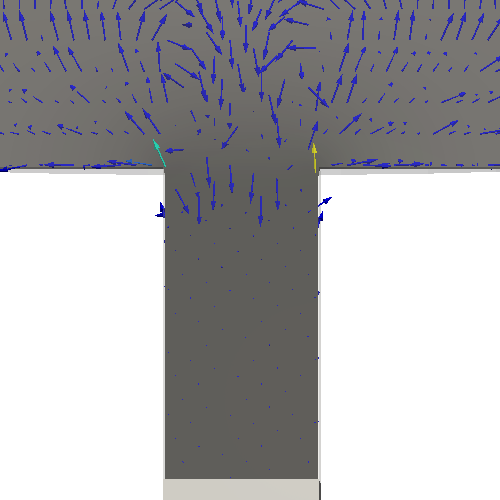
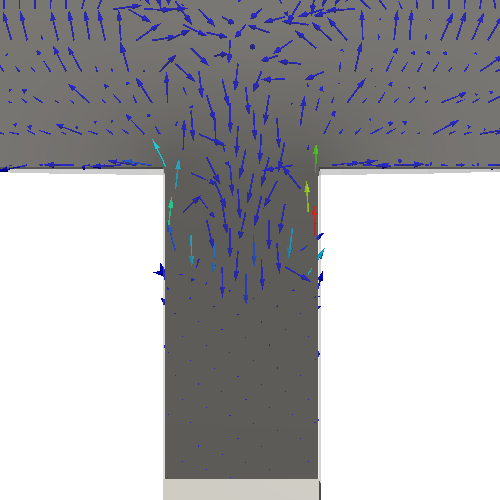


Figure 3. Powder velocity and void fraction rate

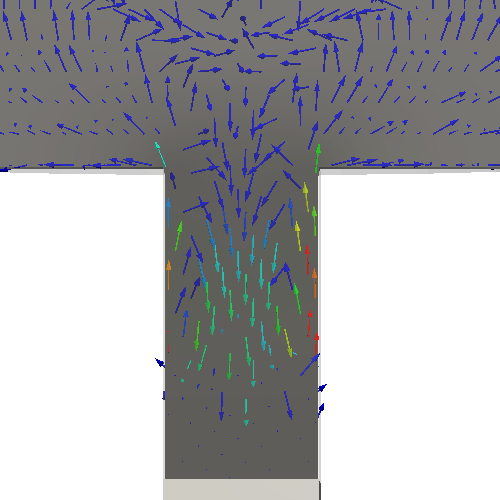
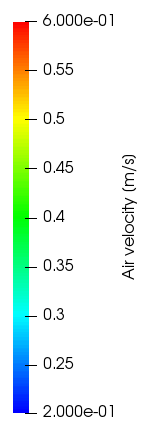
0.02s



0.04s



0.06s



0.08s

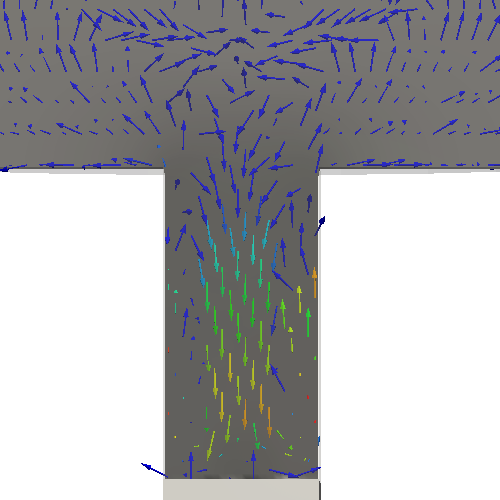


Figure 4. Air velocity and pressure

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下杵降下速度100, 300, 500, 700 [mm/s]

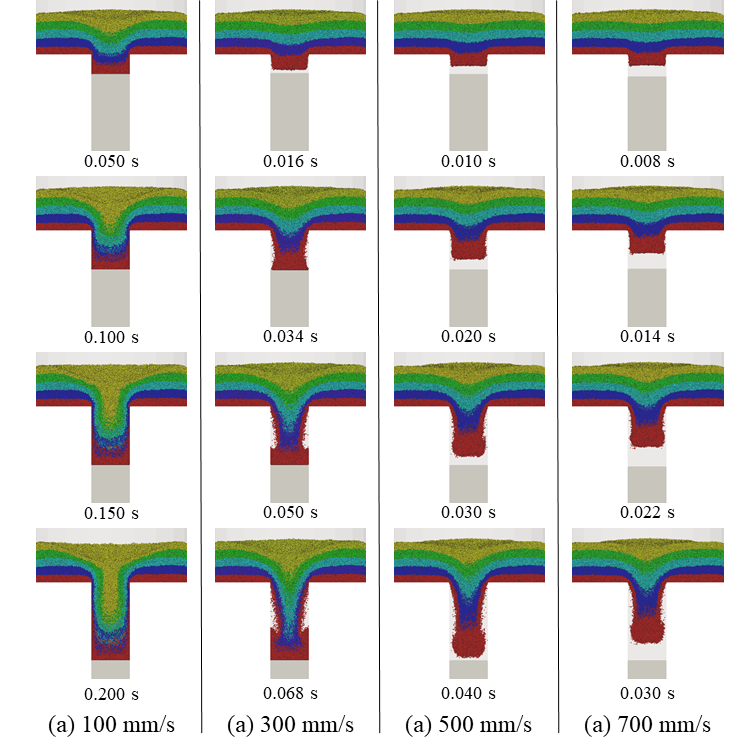


Figure 5. Particle distribution

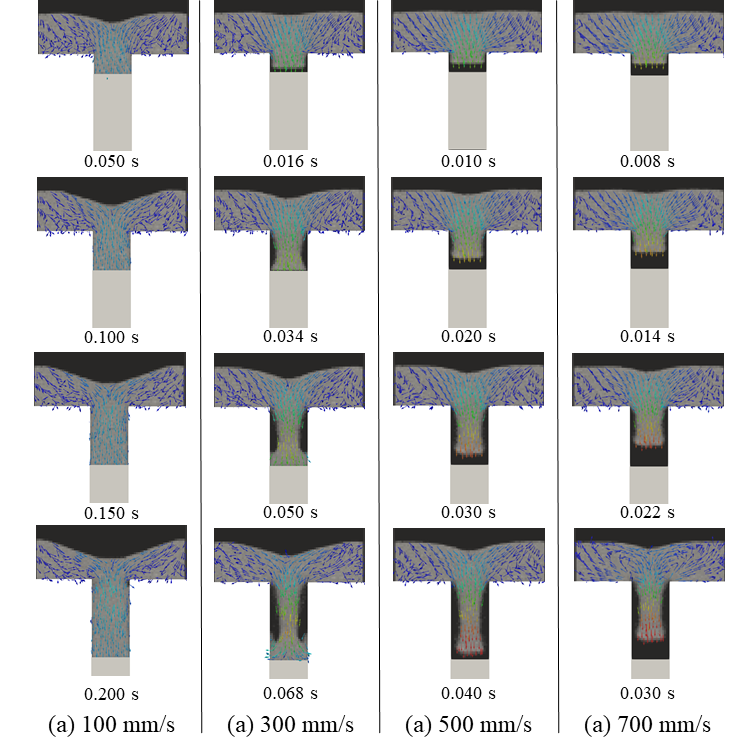
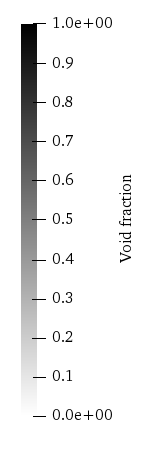
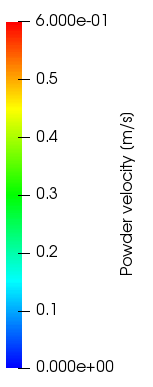


Figure 6. Particle velocity and void fraction rate

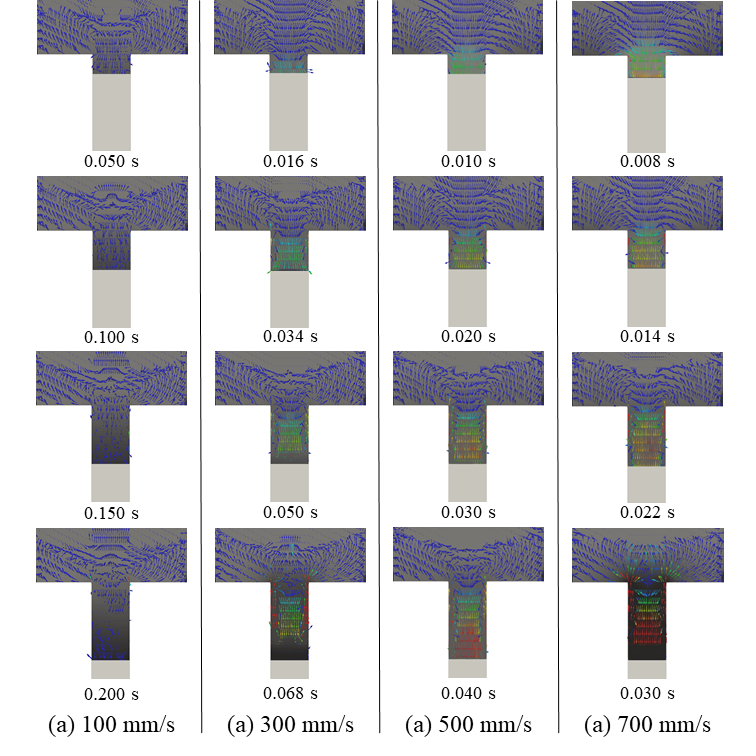
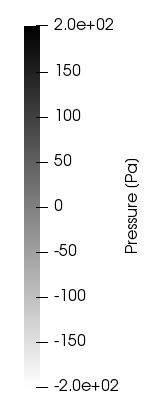
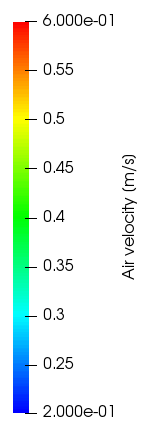


Figure 7. Air velocity and pressure

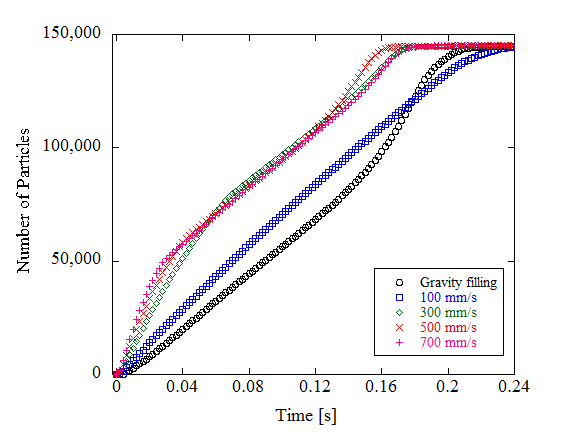


Figure 8. Number of powder particles in die region

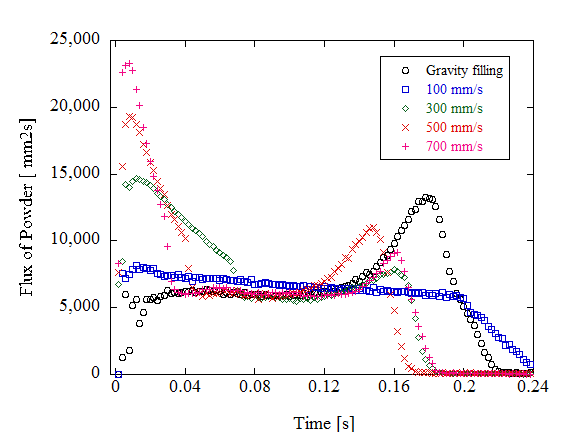
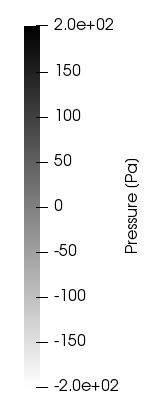


Figure 9. Flux of powder flow



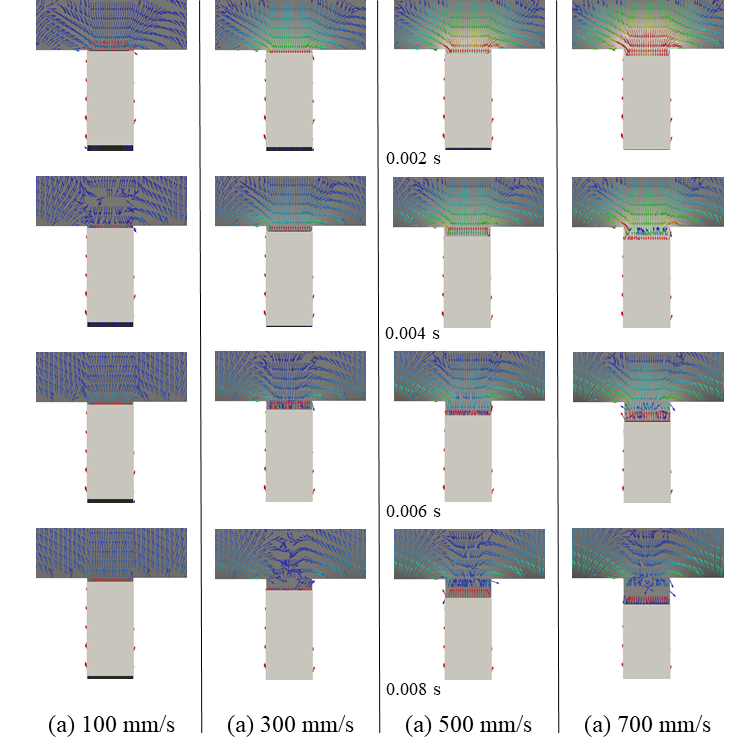
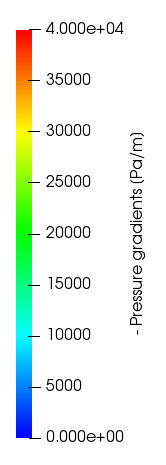
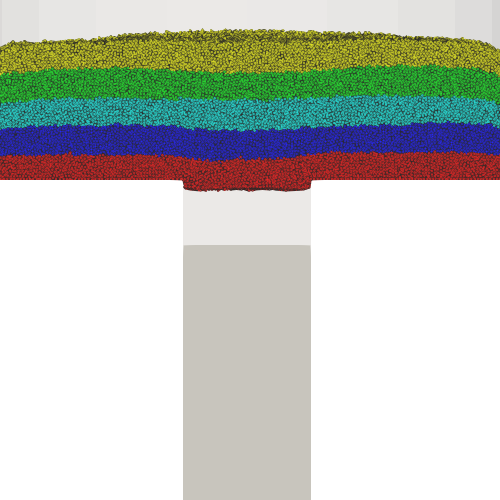


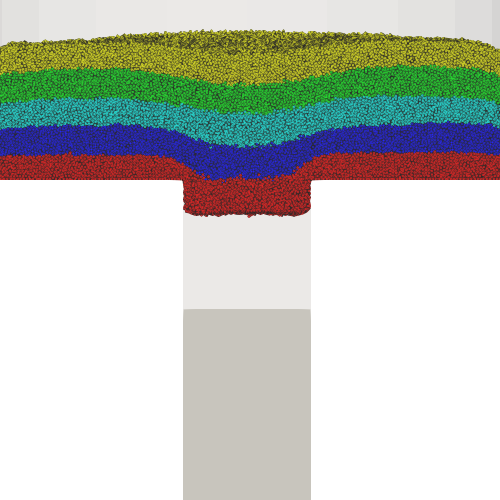
Figure 10. Pressure gradient

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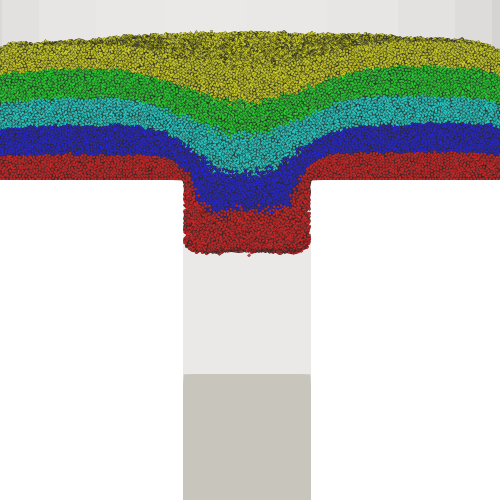
0.010 s



0.020 s



0.030 s



0.040 s

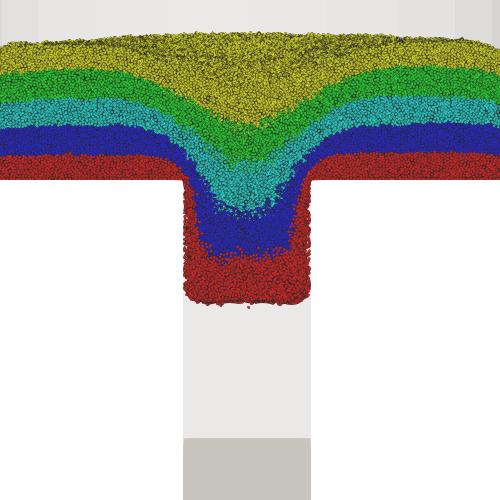
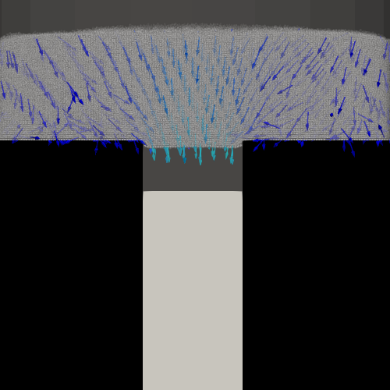
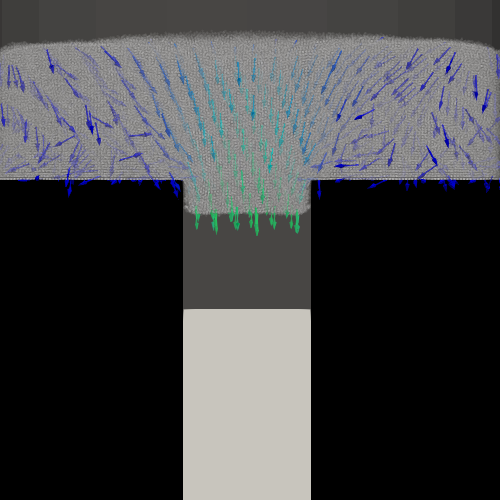
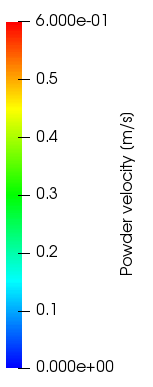


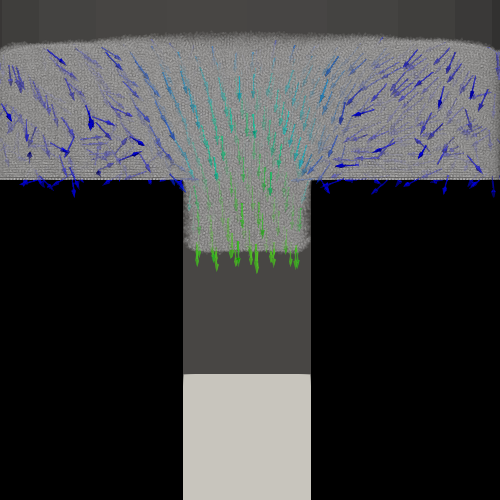
Figure 11. Particle distribution

 0.010 s

0.020 s



0.030 s



0.040 s

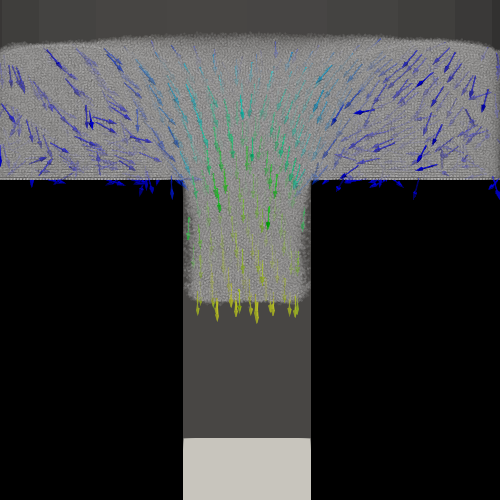


Figure 12. Powder velocity

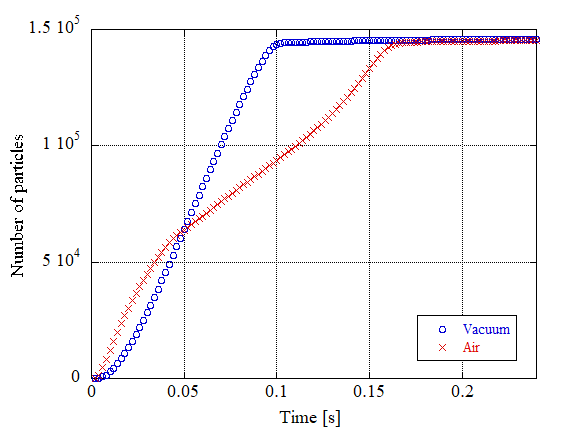


Figure 13. Number of powder particles in die region

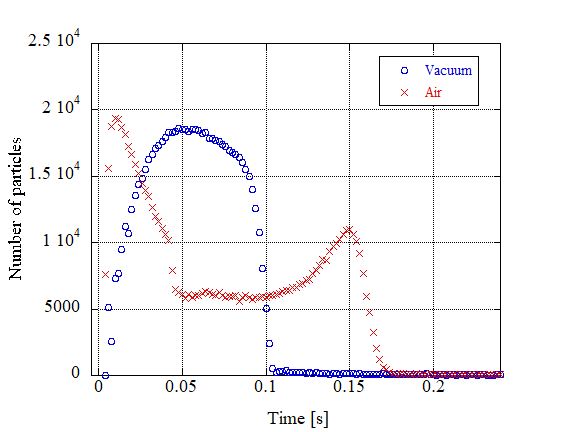


Figure 13. Flux of powder flow

|  |  |  |
| --- | --- | --- |
|  | Vacuum | Air |
|  | 31655 | 30792 |
|  | 31062 | 31521 |
|  | 31812 | 30974 |
|  | 27332 | 27153 |
|  | 24051 | 24797 |

Table 3. Number of particle in each layer