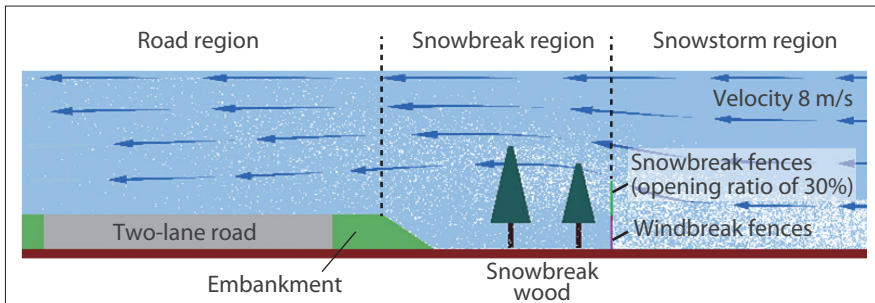


Analysis of Snowbreak Trees

Snowbreak trees are analyzed with Particle Tracking Method using scSTREAM

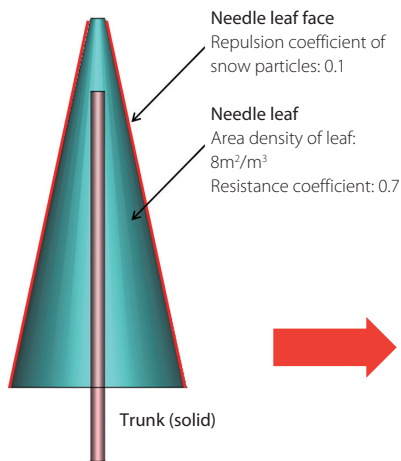
Analysis Descriptions



Inflow air	Power-law (flat land) profile with velocity 8 [m/s] (reference height 10 [m]) and -20 [°C]
Snow particle	<ul style="list-style-type: none"> Density 200 [kg/m³], diameter 100 [μm] Uniform inflow from ground to 3 [m] high Parcel approximation with 1,000 effective particles
Repulsion coefficient	0.5 (applied to boundary faces including ground surface and windbreak fence)
Duration	8 seconds

Figure 1: Snowbreak trees along the road

Analysis Model of a Needle Leafed Tree



Leaf area density	8 m ² /m ³
Resistance coefficient	0.7 pressure loss region
Repulsion coefficient	0.1 for snow particle
Tree arrangement	Two lines of needle-leaf trees with 4-meter gap in zigzag pattern (narrow-band region)
Setting of needle-leafed tree	<ul style="list-style-type: none"> Nursery period 15 years after planting Rearing period 15 years after nursery period Conservation period 30+ years after planting

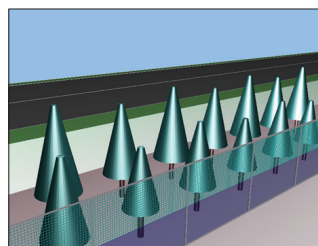


Figure 3: Nursery period (tree height 4.5–6.0m), windbreak fence (2m), snowbreak fence (2m)

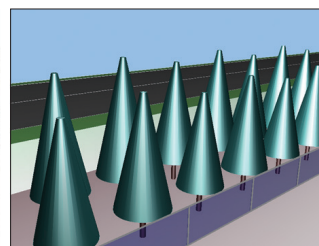


Figure 4: Rearing period (tree height 6.5–8.0m), windbreak fence (2m)

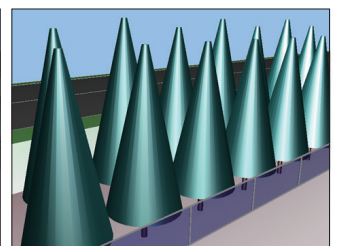


Figure 5: Conservation period (tree height 9.0–10m), windbreak fence (2m)

Figure 2: Needle leaf tree (Cross section)

Analysis Results

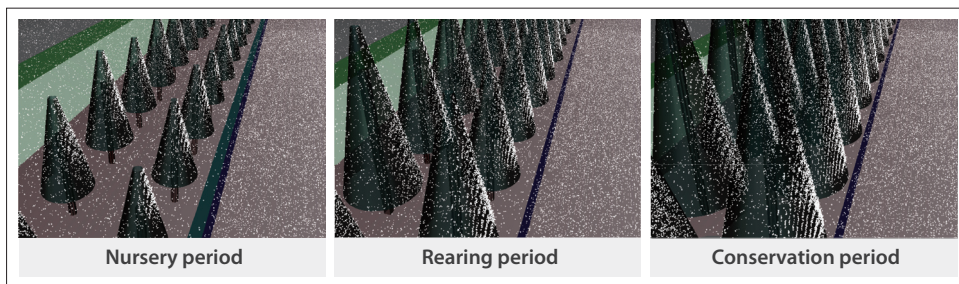


Figure 6: Snow particle behavior

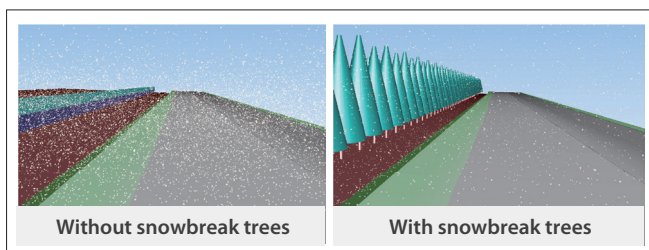


Figure 7: Road visibility

Notes

As the snowbreak trees grow, the number of snow particles increases in the snowbreak region and decreases in the road region, and the snowbreak effectiveness improves.