TWO-WAY COUPLED EULER-EULER SIMULATION OF DRIFTING SNOW

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Abstract

A two-way coupled Eulerian-Eulerian CFD formulation was developed to simulate drifting snow based on a novel viscous treatment of the drifting snow phase. This approach allowed explicit resolution of the saltation layer without resorting to empiricism, unlike other Eulerian-Eulerian models based on mixture formulations and one-way coupling. Initial validations were carried out against detailed snow flux, snow transport, airflow, and turbulence measurements in a controlled experimental simulation of drifting snow in a wind tunnel using actual snow particles. The two-way coupled approach was found capable of accurately simulating drifting snow in the saltation layer and lower suspension layer and agreed with the experimental findings in general. A particle segregation effect observed in natural drifting phenomena and controlled experiments was observed in the simulations as well. Recommendations were made to improve the accuracy of the method and to allow simulating a drifting snow phase with a particle size distribution.

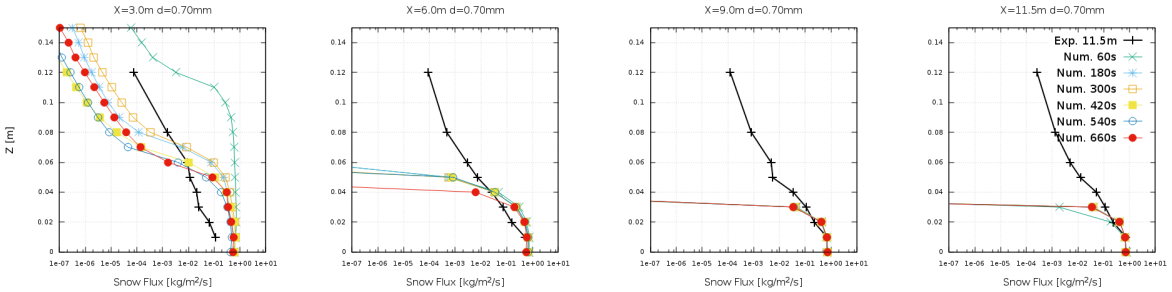

Figure 1: Snow flux for single diameter $d = 0.7mm$.

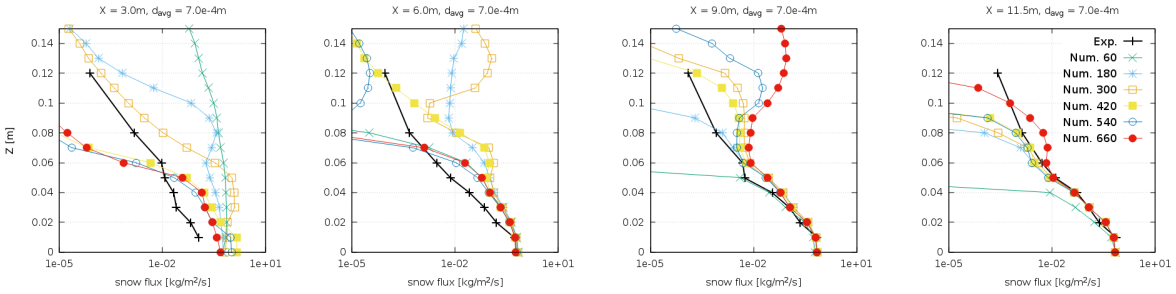

Figure 2: Snow flux for two-parameter Γ distribution average diameter $d_{avg} = 0.7mm$.

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