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# DEPOSITION OF SOLID PARTICLES AT STREAMLINED SURFACE IN TURBULENT FLOW

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Gas-solid particles two-phase flows met in a variety of engineering applications ranging from pneumatic conveying to fluidized bed reactors are accompanied by deposition of solid particles at various surfaces. The understanding of physical mechanisms that govern the deposition is essential for modeling of natural phenomena occurring and optimal design of industrial processes (Kartushinsky et al., 2009).

The influence of parameters of turbulent two-phase horizontal flow on the deposition velocity of solid particles were studied experimentally and theoretically for the horizontal flat plate.

Experiments were carried out in horizontal rectangular channel for the flow velocity of 5.1 m/s. Turbulence of gas flow was generated by the grid, and its intensity was about 3% along the test section. 12 and 23 μm corundum particles were applied in experiments. The quantity of particles deposited along the plate surface was determined by the high-speed imaging technique. The concentration and dynamic parameters of particles brought to the surface were determined by the PTV technique described in Hussainov et al. (2008).

The numerical simulation of the particles deposition was realized under both conditions - laminar and turbulent boundary layers developed near the flat plate surface. The flow conditions were characterized by magnitudes of the velocity of carrier fluid in free stream which was varied from 5 till 15 m/s for the given length of the plate 0.5 m. The behavior of gas and solid particles was approximated by the two-fluid model, or co-existed flow model, taking into account the viscous drag and gravity force factors, which were considered within the one-way coupling, similar to the model by Hussainov et al. (1995). The effect of the form of non-spherical particles was considered by change of factor of drag coefficient.

Analysis of the obtained results has shown that the deposition velocity strongly depends on the conditions of the two-phase boundary layer generated near the surface and the material and size of particles.

## References

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