Aerosol aspiration into a cylindrical sampler from a low-velocity downward flow and from calm air

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Abstract

The problem of aerosol aspiration into a two-dimensional cylindrical sampler from a low-velocity downward flow and from calm air is solved. A simple analytical model for the velocity field of the carrier medium in the vicinity of the sampler with allowance for the finite size of the input orifice is proposed. Parametric studies of the aspiration factor as a function of the Stokes number for different ratios of the free-stream and aspiration velocities and different gravity-induced sedimentation velocities for two positions of the sampler are performed. Sedimentation of particles on the lower side of the cylinder for the sampler with a downward-oriented orifice is discussed. © 2005 Springer Science+Business Media, Inc.

Keywords

Aspiration, Cylindrical sampler, Potential flow