

#### **4.25 TIME DEPENDENT DISPERSION MODEL FOR DUST AND ODOUR - NAST3D/GP**

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Common dispersion models for dust and odour often fail in short range prognosis of the immissions, especially while simulating agricultural sources with low emission heights. For dust immission it is necessary to predict the deposition cutted into size ranges regarding the vegetation near the source.

For odour immission time-series of a concentration are required to get the percentage of time with a concentration above a threshold limit value.

These problems are usually solved by calculating the mean value of dust or odour and using additional mathematical models.

The model NaSt3D/GP is a tool to predict immissions of dust and odour in short distance to agricultural sources. It solves the Navier-Stokes-equations time-dependent with direct numerical simulation (DNS).

This permits to get time series of a concentration as a result.

Non-solid obstacles like trees or hedges are simulated by using a factor to increase the viscosity of the fluid. In addition to that a factor for the ability of the volume to clean the air from dust is implemented.

This allows the realistic prediction of the dispersion of dust near the ground.

The emission is modelled using virtual particles simultaneously to the calculation of the flow. Each particle has its own physical parameters like a diffusion coefficient (simulated via random walk) or a sedimentation velocity. The sources can be points, lines, areas or volumes with a dependency of time. Even wind-induced sources like open poultry barns can be simulated.

The validation of the time-dependency of the concentration of odour has been finished with expected results. The validation of the dust deposition is planned for spring/summer 2004.

Basic functions and predictions of NaSt3D/GP will be discussed in this presentation.