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*Tracing contaminants using non-linear filter approximation.*

The problem of accurately locating the origin of contaminant particles from noisy measurements obtained from a finite number of sensors is treated here. The physical system considered here consists of contaminant particles originating from an unknown location in a confined space which are being carried away by the airflow inside a room. The path of the particles is influenced by both air flow inside the room as well as the inherent random movement of the particles. Concentration of the particles at each sensor is measured at discrete time instances. These measurements are inaccurate due to additive random noise and will be processed under a particle filter algorithm to estimate the origin of contaminant particles. Extensive simulation experiments are carried out to show the effectiveness of particle filters in calculating the origin of contaminant. (Received September 20, 2010)