Estimation of source of a Pollution in the river

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Abstract

In the event of any contamination found in the river, the estimation of subsequent concentration of contamination in the river with time is very important for post-accident management plans. It is totally depended on total amount dumped and its location and therefore it is very important to estimate it correctly as possible.

Advection diffusion modelling may be used describe the transport and diffusion of dumped contamination in the river. A model, which is capable of describing the behavior of contamination in the river, requires speed of water in the river, diffusion coefficients, the amount dumped and its location. The river related data can be obtained easily, but the amount dumped and its location are often unknown. The only available information concerning the contamination is the time history of the contamination concentration at several downstream locations with time.

This paper describes the development of a mathematical model that will be used to estimate the origin and amount dumped into the river resulting from an accidental or purposeful releases. The developed model uses measured concentrations data at observation sites as well as river related data such as river speed and diffusion coefficients. The mathematical model is formulated as a least- squares minimization problem coupled with the solution of an advection-dispersion equation.

The problem involves a point source of pollutant at an unknown location in a river. The spatial distribution of the pollutant concentration are sampled at stations along the river. The sampled data are used to reconstruct the source term parameters. Two types of sources are considered: (1) a pollutant from an instantaneous point source; (2) a pollutant from an extended (continuous) point source of constant release rate.

The main objective is to demonstrate and identify the difficulties associated with solving the inverse problem in river pollution.

Keywords: Parameter estimation; Source term estimation; Pollution; Advection dispersion equation.

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