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DETECTION OF POLLUTION LOAD AND IDENTIFICATION OF ITS DISCHARGED LOCATION AND MAGNITUDE FOR POLLUTED RIVER

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Abstract. *A joint method is proposed for estimating the water quality in terms of BOD and DO and identifying both unknown magnitude and discharged location of the pollution load from noisy measurements on the BOD and DO. In order to detect the discharged load, the innovation process for the water quality estimates plays an important role, and the idea of pseudo-measurements is introduced to identify the magnitude of the pollutive load for both cases of the point- and nonpoint-source loads. The joint estimation and identification method is tested by simulation studies.*

1. **Introduction.** It goes without saying that environmental problems is one of issues to be solved urgently in order to sustain our human life. Water quality management is especially one of the most important problems. The authors have been concentrating their attention to the analysis and estimation for the self-purification of polluted rivers based on the water quality equations on the two major indices BOD (biochemical oxygen demand) and DO (dissolved oxygen) [1-3]. As everyone knows, the DO is the most important index in the purification of a river because fish and other underwater organisms die without oxygen. The BOD is the maximum amount of oxygen per unit volume that the pollutants could consume. These are governed by a pair of coupled differential equations, known as the Streeter and Phelps model.

In previous research [1-3], using the water quality state space model obtained from the couple of second-order equations which are derived first by Gundelach and Castillo [4], the authors have treated the analysis of self-purification mechanism under pollution loads, considered the water quality estimation from noisy measurement data on the BOD and DO, and investigated the reinforcement of self-purification.

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