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We shall report recent progress on the problem of parameter estimation of a model of water quality in a lake. The model under consideration consists of a set of drift-diffusion-reaction equations with mixed boundary conditions on a rough boundary. The state variables of the system are the phytoplankton, the oxygen, the dissolved nutrients and the zooplankton concentrations. The system is driven by several exogenous inputs, such as wind velocity and direction, water temperature, and solar radiation.

The inverse problem under consideration here is plagued by all the usual difficulties including the fact that we have massive amount of noisy data as well as missing information and model imperfections.

We discuss a few different theoretical approaches and present numerical results from real data associated to the Serra da Mesa basin. (Received February 14, 2008)