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Azmy S. Ackleh*, Department of Mathematics, University of Louisiana at Lafayette, Lafayette, LA 70504-1010, and **Robert Miller**, 135 Regency Sq., Lafayette, LA 70508. *A Model for the Interaction of Phytoplankton Aggregates and the Environment: Approximation and Parameter Estimation.*

We present a model for the dynamics of phytoplankton aggregates and their interaction with the environment in a well-mixed reactor or surface layer of a water column. The biophysical problem yields a nonlinear partial differential equation coupled with a general system of ordinary differential equations. We first develop a finite difference scheme for approximating the solution of this model. Then convergence results are established for the finite difference method. A least-squares parameter estimation method is presented to illustrate the performance of the model against real data, and to highlight the effects of aggregate growth on algal bloom dynamics and nutrient consumption rates. (Received September 19, 2016)