Title: A PDE system modeling the growth of phytoplankton consuming inorganic carbon with internal storage in a water column

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Abstract:

In this talk we shall discuss the effect of global warming on the growth of phytoplankton in the ocean and lakes. We present a system of reaction-diffusion equations which models the growth of a single species

population consuming inorganic carbon that is stored internally in a poorly

mixed habitat. Inorganic carbon takes the forms of "CO2" (dissolved CO_2

and carbonic acid) and "CARB" (bicarbonate and carbonate ions), which are

substitutable in their effects on algal growth. We apply a generalized Krein-Rutman

Theorem involving two different cones by Mallet-Paret & R.D. Nussbaum in 2010 to

establish a threshold type result on the extinction/persistence of the species in terms of

the sign of a principal eigenvalue associated with a nonlinear eigenvalue problem.

This talk is based on my recent work jointly with Drs. Feng-Bin Wang (Chang-Gung University) and King-Yeung Lam (Ohio State University).