

First Joint Meeting Brazil Italy of Mathematics Special Session: Analytical and Numerical Aspects of Modeling Biological Systems

Rio de Janeiro, August 29 - September 02, 2016

Title: Dispersion of carbonic dioxide in flooded areas: modelling and simulations

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Abstract: The carbon dynamics in tropical ecosystems has received considerable importance because of the need to understand the effects of changing land cover in global and regional biogeochemical cycles, as well as the role of tropical terrestrial ecosystems in the carbon dioxide balance. It is estimated that tropical wetlands known as swamps, occupying an area of the Earth's surface between 5% and 7%.

The high net primary production of organic matter produced by natural decay, makes tropical wetlands an important carbon sink. Small changes in climate, water and nutrient regime, as well as in land use can alter the delicate balance of these areas. In this work, we investigated the CO₂ flow problem in the Pantanal of Mato Grosso region, considered an important regulatory system of the environment, because of the rain and flood regime affecting the seasonal distribution of energy and carbon in this region.

The objective is to propose a mathematical model that can represent the dynamics of CO₂ flow in the local atmosphere. In this case it has been proposed a two-dimensional model that describes the process of CO₂ dispersion for laminar flow in a horizontal direction in its classic formulation, using an equation of advection-diffusion-reaction. For computer simulations of the phenomenon we used the finite element method through the Petrov-Galerkin scheme for the spatial discretization of the model obtained and the Crank-Nicolson method for the time discretization.

The numerical codes were implemented in Matlab and the approximations of the solutions in certain moments of time have been presented through graphical animations by this feature of Matlab.