"Gheorghe Asachi" Technical University of Iasi, Romania

NUMERICAL SIMULATION OF THE OXYGENATION PROCESS IN A GROWING SUPERINTENSIVE FISH TANK

Vasilica Ştefan[1]∗, Raluca-Cătălina Mocanu[2], Lucreţia Popa[1], Radu Ciupercă[1], George Lazăr[1], Albert-Silviu Petcu[1], Ana Zaica[1]

[1]*National Institute of Research - Development for Machines and Installations Designed to Agriculture and Food Industry – INMA, 6 Ion Ionescu de la Brad Blvd., Sector 1, Bucharest, Romania*
[2]*Politehnica University of Bucharest, 313 Splaiul Independenţei, Sector 1, Bucharest, Romania*

Abstract

Superintensive growth of fish in a controlled environment involves taking a series of measures to ensure the oxygen necessary to provide optimal living conditions for stocks. Considering the fact that oxygen has a relatively low solubility in water, the photosynthesis in basins does not occur and the rate of incoming water may be low, it is imperative to supplement the water with oxygen. The paper presents theoretical researches on mathematical modelling and numerical simulation of the dispersion of dissolved oxygen injected through porous diffusers in a cylindrical tank, used in fish superintensive growth. The paper aims to identify the optimal placement and sizing aeration system by choosing an adequate number of porous diffusers. In order to carry out the numerical simulation the FlexPDE6 software was used. The simulations have been done in order to judiciously design a recirculating system where oxygen may become one limiting factor in the sense that if falls below optimal value, the fish population is predisposed to asphyxia and death can rapidly occur.

Key words: aquaculture, dissolved oxygen, FlexPDE6, numerical simulation, porous diffuser

Received: October, 2014; Revised final: July, 2015; Accepted: August, 2015

∗ Author to whom all correspondence should be addressed: e-mail: valle_vali@yahoo.com