

Accepted Manuscript

Title: Influence of fish swimming on the flow pattern of circular tanks

Author: Ingrid Masaló Joan Oca

PII: S0144-8609(16)30054-1

DOI: <http://dx.doi.org/doi:10.1016/j.aquaeng.2016.07.001>

Reference: AQUE 1852

To appear in: *Aquacultural Engineering*

Received date: 30-3-2016

Revised date: 14-6-2016

Accepted date: 4-7-2016



Please cite this article as: Masaló, Ingrid, Oca, Joan, Influence of fish swimming on the flow pattern of circular tanks. *Aquacultural Engineering* <http://dx.doi.org/10.1016/j.aquaeng.2016.07.001>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Influence of fish swimming on the flow pattern of circular tanks

Ingrid Masaló^{*1}, Joan Oca¹

¹Departament d'Enginyeria Agroalimentària i Biotecnologia

Universitat Politècnica de Catalunya (BARCELONATECH)

C/ Esteve Terrades 8

08860 Castelldefels, Spain

Phone: 0034 935521057

E-Mail: ingrid.masalo@upc.edu

Highlights

Velocity profiles in a circular tank with and without fish were compared.

The average velocity was proportional to the square root of the impulse force.

Higher tank resistance coefficients were observed in experiments with fish.

A reduction in velocity near the tank outlet was detected in experiments with fish.

Oca and Masaló model was modified for a tank with swimming fish.

Abstract

The effect of swimming fish on the average velocity and velocity profile of a circular tank was studied. Working with different inlet diameters and flow rates, nine different impulse forces (configurations) were evaluated. Each configuration was tested with and without fish, and the effects of two different fish sizes were compared.

The velocity profiles in experiments with fish presented a considerable reduction in velocity in the centre of the tank near the outlet, which was a consequence of the increase in the kinematic eddy viscosity due to the turbulence introduced by fish swimming. A flattening of the angular velocity profile was observed in the central area of the tank, which had a radius of about 0.3 m (18% of the total volume of the tank).

A previous model proposed by Oca and Masaló (2013) was modified in order to better describe the distribution of velocities in the central volume of a tank with swimming fish. The proposed modification was based on Burgers' proposal for a bathtub vortex, which implies the determination of the parameter $(1 - e^{-\alpha r^2})$, where r is the radius and the α values were experimentally obtained for each tank configuration, in which they increased with the impulse force.

Download English Version:

<https://daneshyari.com/en/article/6381247>

Download Persian Version:

<https://daneshyari.com/article/6381247>

[Daneshyari.com](https://daneshyari.com)