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ABSTRACTS
B O O K

**7th International Congress on Energy and Environment Engineering and Management
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Analysis of Natural Treatment Systems for Wastewater (NWST) by constructed wetlands for the management in livestock farms. A computational fluid dynamic model

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Wetlands represent one of the world's most important types of ecosystems, and are also one of the most threatened. Wetlands play a critical role in climate change, biodiversity, hydrology, and human health [1]. Constructed wetlands (CWs) are engineered systems designed to take advantage of naturally-occurring processes involving wetland vegetation, soils and associated microbial assemblages for environment clean-up [2]. Nowadays, it is highly recommended to develop a process-based model which can explain the various processes occurring within the wetland system. [3]. **The main objective** of this work is to develop a computational model to use CWs for Natural Treatment Systems for Wastewater (NTSW) in livestock farms in Gran Canaria.



Image 1. CW around facultative pond

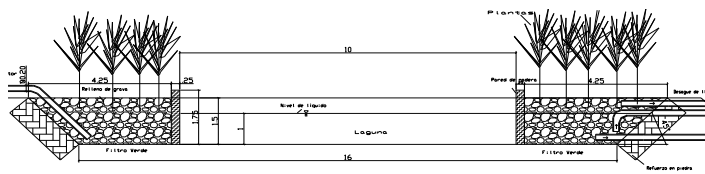


Image 1. Section of CW and facultative pond

The proposal model is based on Richards' equation (1), a strongly nonlinear expression which requires efficient numerical methods for its integrations.

$$\text{div}(K K^A \nabla h) = \frac{\partial \theta}{\partial t} + S \quad (1)$$

Finite element method is established as an effective procedure to simulate on the computer the variations of the fluids dynamic and FreeFem++ program is a partial differential equation solver. It can solve the water movement equation in different cases that take place over three-dimensional flow domains, permitting the simulation of complex systems which may be impossible to model by simply one or two dimensional schemes.

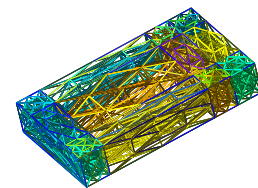


Figure 3 Example of the CW's mesh in

In conclusion, with this work, the behaviour of the CWs will be predicted with different factors and we will be able to design the better solution for effluent of livestock farms.

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