

CFD STUDIES IN ELECTROCHEMICAL FILTER PRESS REACTORS

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INTRODUCTION

Filter press reactors are one of the most important electrochemical reactors due to its numerous attractive characteristics (availability of components, versatility, easy scale-up, etc.), however, its hydrodynamics are not studied in great detail. The most usual techniques in order to study the flow inside the compartment are the direct flow visualization and the modelization of RTD (Residence Time Distributions) curves.

In this work a new approach to study this research field has been used by the study of a system with CFD techniques (Computational Fluid Dynamics). We can define CFD

as the analysis of systems with fluid flow through a computer simulation. The importance of this technique lies in the cost reduction you can achieve. The variable cost of an experiment, in terms of facility hire and/or man-hour costs, is proportional to the number of configurations tested. In contrast, CFD studies can produce extremely large volumes of results at virtually no added expenses and it is very cheap to perform parametric studies, for instance to optimise equipment performance.

We have validated a mathematical model based on RTD studies for a filter press reactor using CFD studies.

EXPERIMENTAL SET-UP

We have studied the UA63-03 reactor made in the University of Alicante. Figure 1 shows a sketch of the reactor with an example of a possible mesh for CFD studies.

The simulations have been done by the commercial package FEMLAB 2.3.

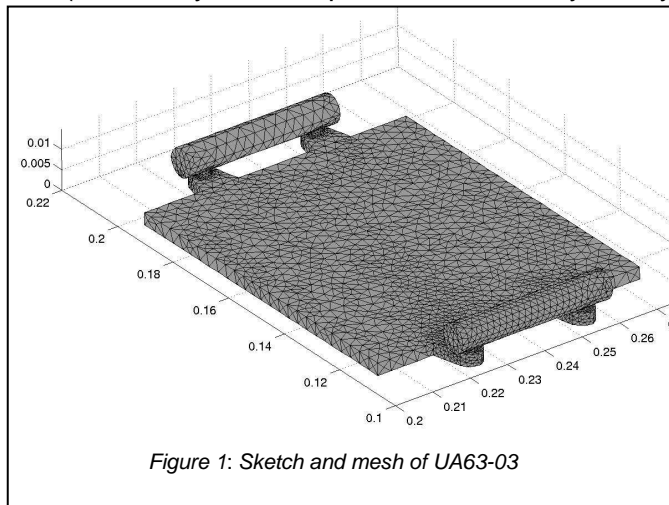


Figure 1: Sketch and mesh of UA63-03

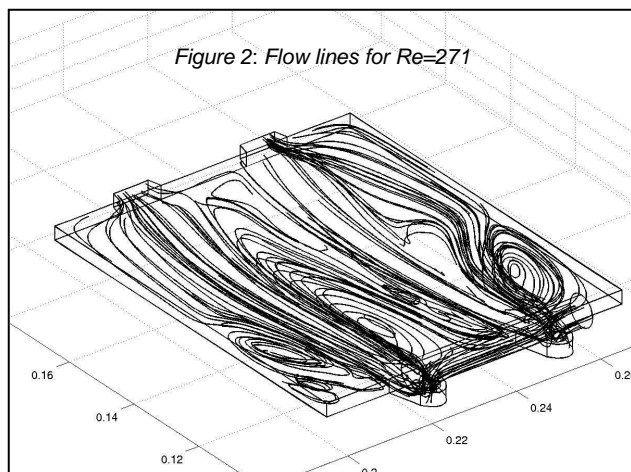


Figure 2: Flow lines for $Re=271$

RESULTS

The results obtained (Figure 2) shown a great agreement with the previous studies made by RTD and with the direct flow visualization experiment carried in the same compartment.