

## Studies on the application of different ANNs to predict permeate flux in rotating disk membrane modules: A case study with MATLAB™

Chiranjib Bhattacharjee<sup>a\*</sup>, Dwaipayan Sen<sup>a</sup>, Projjwal Sarkar<sup>a</sup>, S. Datta<sup>a</sup>, P.K. Bhattacharya<sup>b</sup>

<sup>a</sup>Department of Chemical Engineering, Jadavpur University, Kolkata 700 032, India

Tel: +91 92 3056 2975; Fax: +91 33 2414 6007; email: cbhattacharyya@chemical.jdvu.ac.in

<sup>b</sup>Department of Chemical Engineering, Indian Institute of Technology, Kanpur 208 016, India

Received 28 April 2007; Accepted 28 July 2008

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### ABSTRACT

Stirred rotating disk membrane modules (RDMM) have been found to provide maximum flux enhancement due to minimization of the concentration polarization layer by shear effect. But unfortunately rigorous theoretical modeling of RDMM has not been developed yet, which greatly affects the simulation and optimization of this device under applications in many fields. In this perspective, the work reported in this article was carried out to develop an efficient artificial neural network (ANN) capable of predicting permeate flux in case of RDMM. Different ANNs, like Feedforward, Elman, Hopfield and Radial Basis Network, were investigated to find the optimum network configuration and corresponding network parameters have been estimated. As a case study, the focus was given to ultrafiltration (UF) of casein whey, a complex protein mixture. For this purpose the UF of whey was carried out in RDMM at different pH and transmembrane pressures, with and without rotating the membrane. A detailed comparative study was made on the validation results between the predicted flux and corresponding experimental values for different ANNs investigated. Based on the results, it was concluded that the Radial Basis Network was most accurate in terms of flux prediction and stability for UF using RDMM.

**Keywords:** Rotating disk membrane module; Ultrafiltration; Flux; pH; Transmembrane pressure; Neural network

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\* Corresponding author.