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Mst Fazana Rahman Zuthi, Wenshan Guo, Huu Hao Ngo, Duc Long Nghiem, Faisal.I. Hai, Siqing Xia, Jianxin Li, Jixiang Li, Yi Liu

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Zuthi, Mst Fazana Rahman[a,b], Guo, Wenshan[a] , Ngo, Huu Hao.[a]*, Nghiem, Duc Long[c], Hai, Faisal. I.[c], Xia, Siqing[d], Li, Jianxin[e], Li, Jixiang[f], Liu, Yi[f]

[a]*School of Civil and Environmental Engineering, University of Technology Sydney, Sydney, NSW 2007, Australia*
[b]*Department of Civil Engineering, Chittagong University of Engineering and Technology, Chittagong-4349, Bangladesh.*
[c]*School of Civil Mining and Environmental Engineering, University of Wollongong, Wollongong, NSW 2522, Australia*
[d] *School of Environmental Science and EngineeringTongji UniversityShanghaiP.R. China*
[e]*State Key Laboratory of Separation Membranes and Membrane Processes, School of Materials Science and Engineering, Tianjin Polytechnic University, Tianjin 300387, China*
[f]*Shanghai Advanced Research Institute, Chinese Academy of Science, Zhangjiang Hi-Tech Park, Pudong, Shanghai, China*

* Corresponding author: School of Civil and Environmental Engineering, University of Technology, Sydney (UTS), P.O. Box 123, 15 Broadway, Ultimo, NSW 2007, Australia. Tel.: +61 2 9514 2745; Fax: +61 2 9514 2633. *E-mail address:* h.ngo@uts.edu.au or ngohuuhao121@gmail.com

Abstract

This study aimed to develop a practical semi-empirical mathematical model of membrane fouling that accounts for cake formation on the membrane and its pore blocking as the major processes of membrane fouling. In the developed model, the concentration of mixed liquor suspended solid is used as a lumped parameter to describe the formation of cake layer including the biofilm. The new model considers the combined effect of aeration and backwash on the foulants' detachment from the membrane. New exponential coefficients are also included in the model to describe the exponential increase of transmembrane pressure that typically occurs after the initial stage of an MBR operation. The model was validated using experimental data obtained from a lab-scale aerobic sponge-submerged membrane bioreactor (MBR), and the simulation of the model agreed well with the experimental findings.