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Comment

There is a mistake in Chen's model published in volume 128

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There is a mistake in Chen's model and results [1]. The primary goal of this letter is to disprove Chen's model and results. In his model, the pressure gradient along the channel was assumed to be 12 Pa m^{-1} [1]. But as Fig. 1a[1] shows, the fuel concentration decrease by about 50% within the 10 cm long channel. Because there is a relationship between pressure and concentration, that is ideal gas equation, we can image that if the pressure decays so much, the assumption of 12 Pa m^{-1} will made too much error. Actually, if we bring the results back to the momentum equation,[2] the momentum can not be conservation at all. So the ideal gas equation must be added to the governing equations. Then the Eqs. (14)[3] and (15)[4], will be changed to:

$$K_2\frac{\mathrm{d}(\tilde{c}\tilde{u}^2)}{\mathrm{d}x} + K_3\frac{\mathrm{d}\tilde{c}}{\mathrm{d}x} + K_4\tilde{c}^{\gamma}\tilde{u} + K_5\tilde{u} = 0 \qquad K_3 = \frac{RT}{Mu_0}$$

The new results then can be calculated by the new equations and are presented in Fig. 1. It is totally different between the new results and Chen's. It is found that the fuel concentration decays little along the channel, while the flow velocity decrease monotonically along the channel because of the depletion of fuel downstream. In fact, the fuel concentration and current density can almost be considered to constant along the channel. So Chen's results were totally wrong.

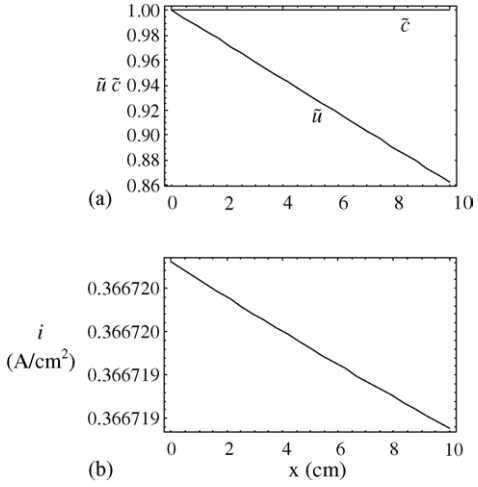

Fig. 1. New results: (a) dimensionless velocity $\tilde{u}$ and concentration $\tilde{c}$; (b) generated current density. Results are calculated on basis of base case shown in Table 1. (Published in page 128 in volume 128.)

Reference

[1] F.L. Chen, Y.Z. Wen, H.S. Chu, Convenient two-dimensional model for design of fuel channels for proton exchange membrane fuel cells, J. Power Sources 128 (2) (2004) 125–134.

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[1] Published in page 128 in volume 128.

[2] Published in page 127 in volume 128.

[3] Published in page 127 in volume 128.

[4] Published in page 128 in volume 128.

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