

CH 692 W1D1 In class work

**Problem 1:**

Explain how this equation for a porous electrode describes materials balance. What is balancing what and how is that represented mathematically?

$$\frac{\partial \epsilon c_i}{\partial t} = -\nabla \cdot \mathbf{N}_i - a \frac{s_i}{nF} i_n = -\nabla \cdot \mathbf{N}_i - \frac{s_i}{nF} \nabla \cdot \mathbf{i}_2$$

**Problem 2:**

- What is  $u^2$ ? Discuss among your classmates what it means physically and how that is described by the equations in the text.
- Explain the trend observed in the data below.
- Sketch what you predict for  $u^2 = 0.01$ . Explain this prediction. If you have a computer handy, you can plot the equation and see if your prediction and explanation was correct!
- Sketch what you predict for  $u^2 = 1$  and 100 but now for  $K_r = 10$ . Explain this prediction. If you have a computer handy, you can plot the equation and see if your prediction and explanation was correct!

$$v^2 = \frac{a i_o (\alpha_a + \alpha_b) F L^2}{RT} \left( \frac{1}{\kappa} + \frac{1}{\sigma} \right) \quad \text{and} \quad K_r = \frac{\kappa}{\sigma}$$

