Department of Chemical Engineering
Tutorial Sheet No. 6
Topic: Momentum Balance

Name_____ Roll No_____ Date_____

Q1. Develop velocity profile for laminar flow in the pipe at steady state. To simplify the problem it assumed that the fluid is incompressible and momentum balance on a shell with radius r, thickness Δr and length Δz as shown in Fig 1. Also reduced the one-dimensional distributed parameter system in to a lumped parameter system at steady state.

Q2. We consider the diffusion of a component A coupled with the following chemical reaction A → B in a slab of catalyst shown in Fig 2. Develop the mathematical model to determine the variation of the concentration at steady state. The concentration inside the slab varies with both the position z and time t. The differential element is a shell element of thickness Δz.

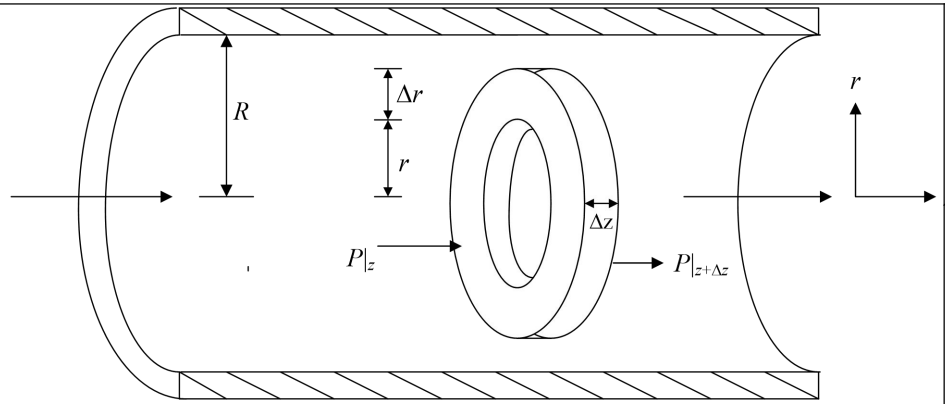

Fig. 1 Velocity profile for a laminar flow in a pipe

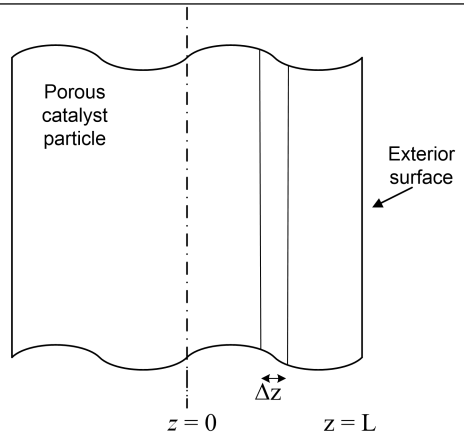

Fig. 2 Diffusion with chemical reaction inside a slab catalyst