**237b Shortcut Methods for Multicomponent Gas Separation by Permeation in Membranes**

*Richard A. Davis*

Popular separations textbooks present membrane based gas separation for binary systems. Plug flow models for hollow fiber modules involve the solution to systems of differential equations by the shooting method, or multivariable optimization. Implementation of these models and solution methods may be beyond the scope of a survey course on separations, and are typically reserved for advanced courses on membrane or rate-based separations.

In this contribution, simple "shortcut" algebraic models of multicomponent gas separation by permeation are presented. The short cut models require the solution of a nonlinear function in one unknown variable. The model equations may be solved by undergraduate students using typical engineering computational software, such as Excel or Mathcad. When needed, the short cut models include the effects of pressure drop through the fiber lumen.

Examples compare the short cut solution with the rigorouse plug flow model solutions. These short cut methods are readily incorporated into steady-state process simulators, suchs as HYSYS.