From Nauman and Buffham 12a

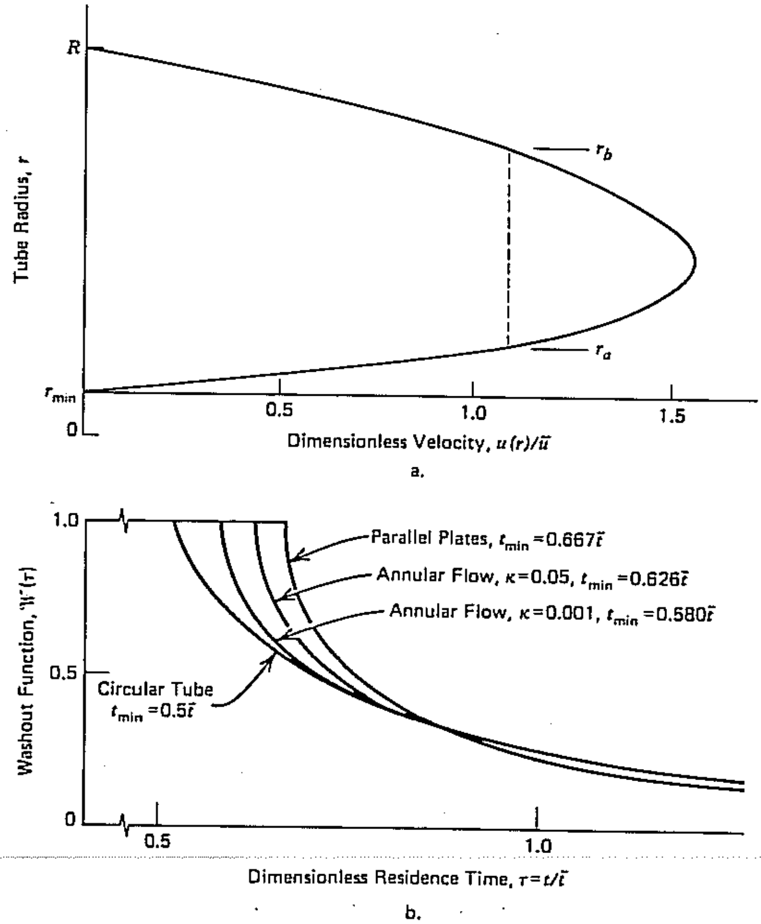

Figure 2.9 Laminar flow in an annulus. (a) Velocity profile for annular flow; (b) Residence time distributions.

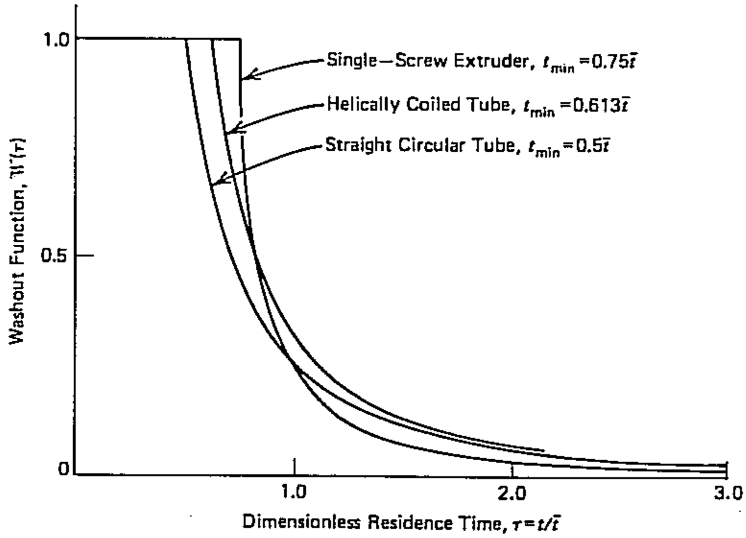

Figure 2.10 Complex laminar flows.

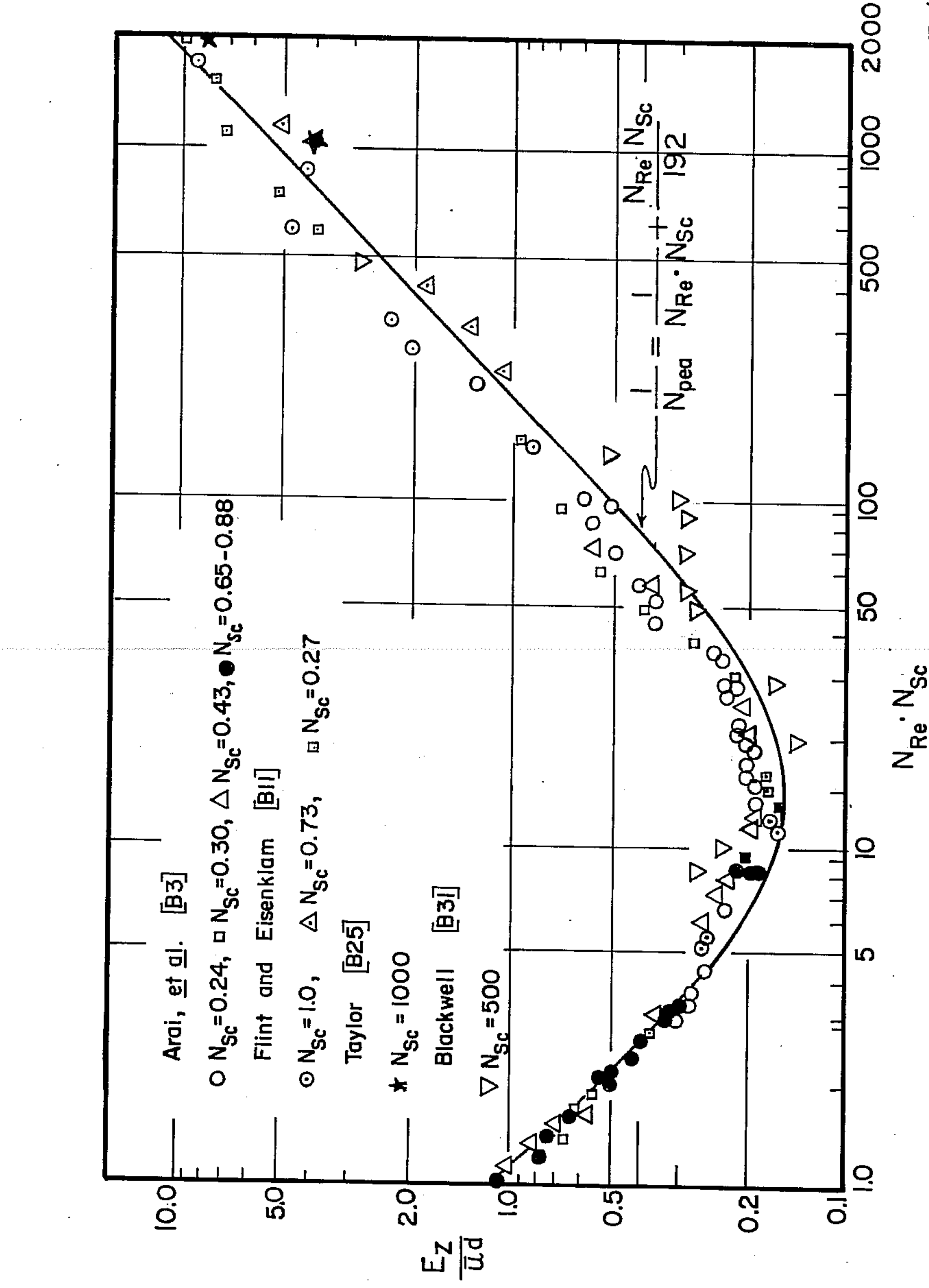

Fig. 5-16. Correlation of Axial Dispersion Coefficient for Flow of Fluids Through Pipes in Laminar Flow Region (N_{Re} < 2000)

$Re = \frac{\bar{u}d}{\nu}$

$Sc = \nu/D$

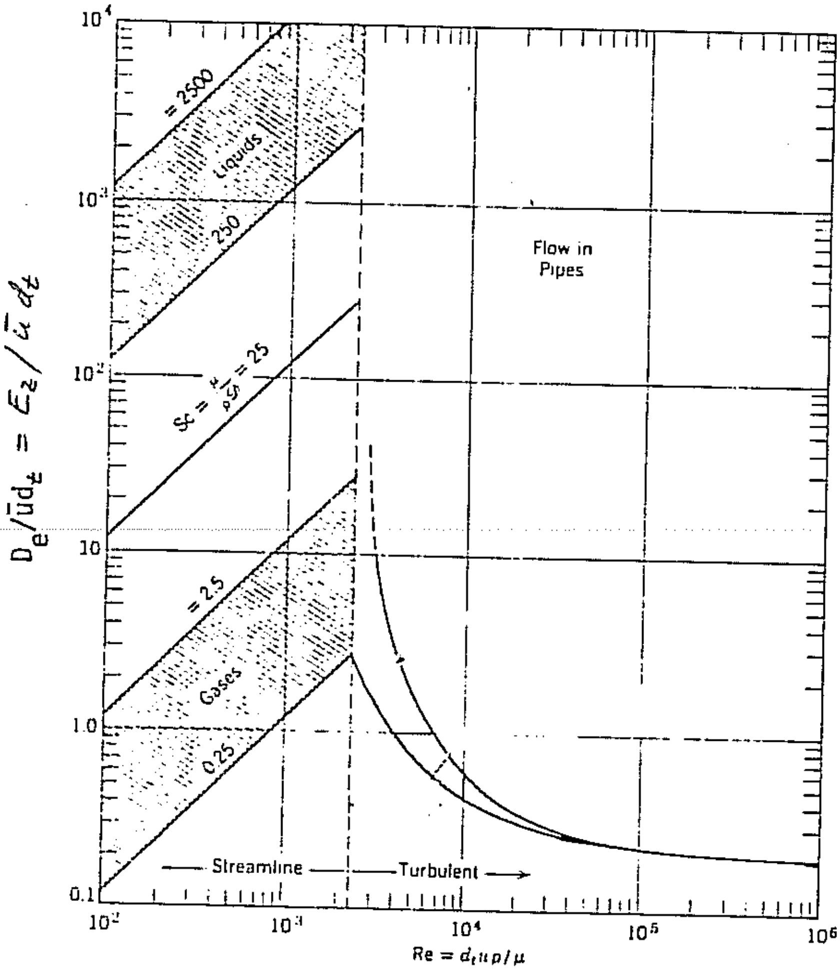

Figure 4. Dispersion intensity vs. Reynolds number for flow of fluids in empty pipes. (from Levenspiel, Chemical Reaction Engineering, New York, John Wiley & Sons, Inc. (1972))

$Re = \frac{\bar{u}d}{\nu}$

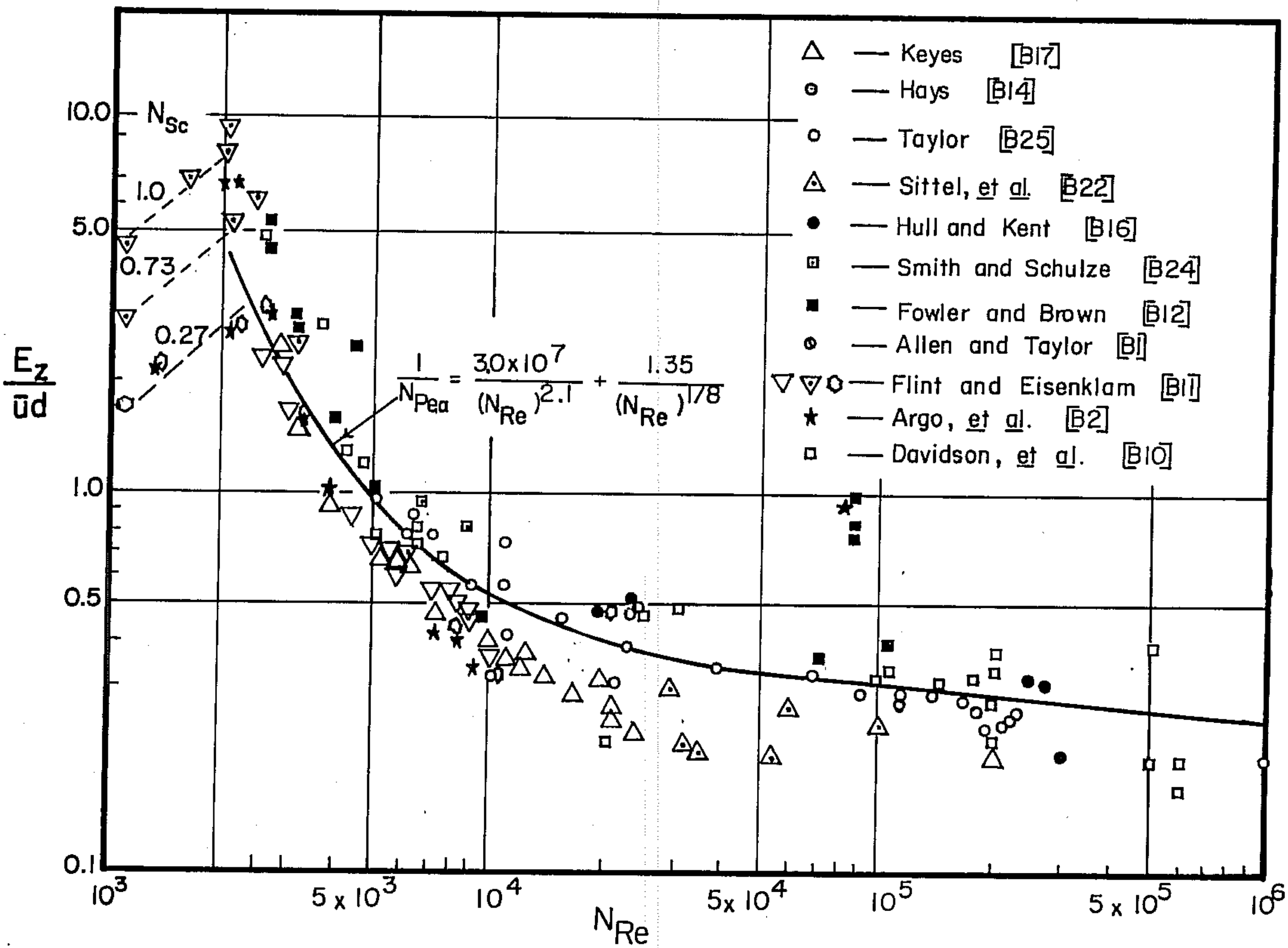

Fig. 5-15. Correlation of Axial Dispersion Coefficient for Flow of Fluids Through Pipes for Reynolds Number Larger than 2000

$Re > 2000$

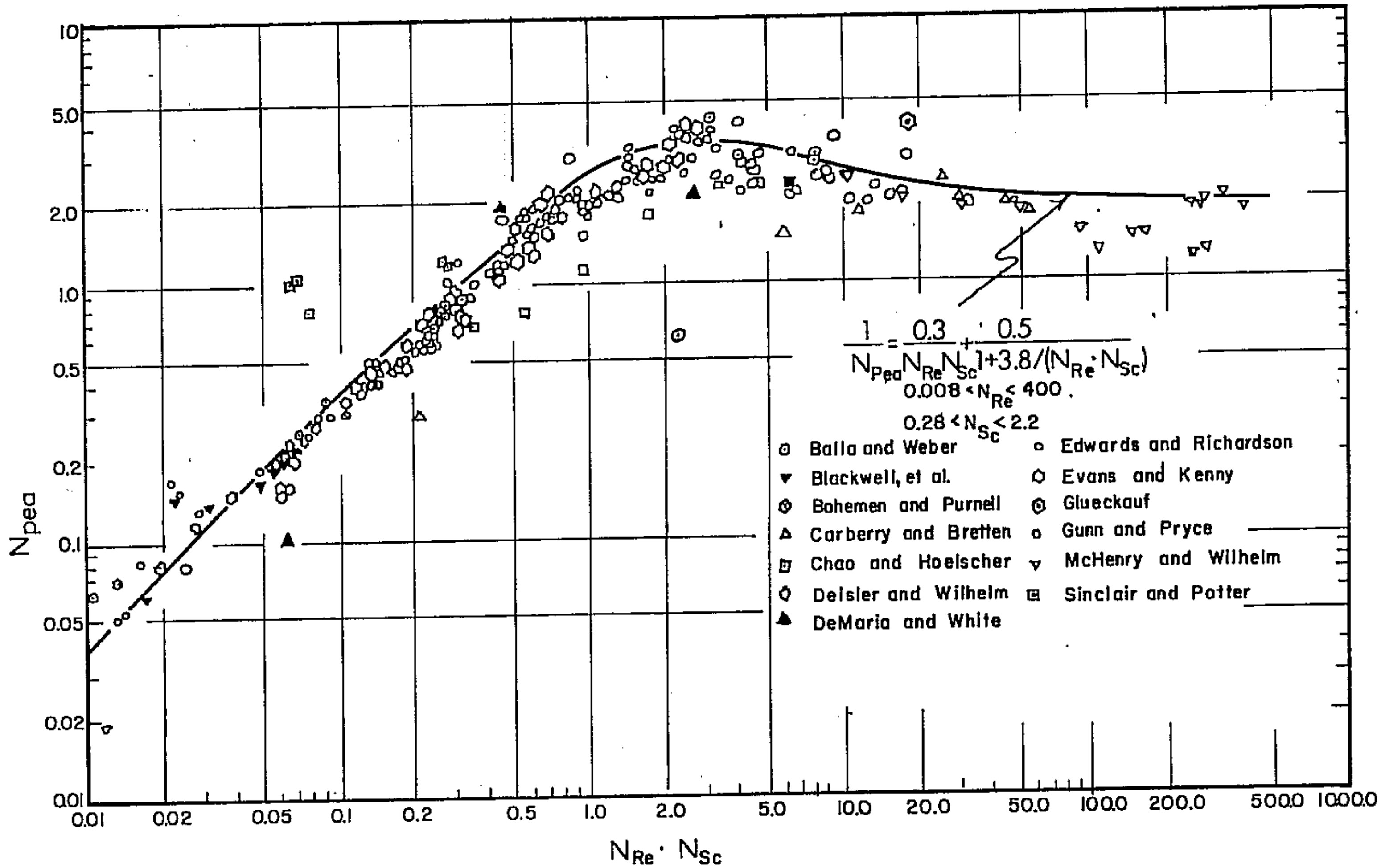

Fig. 5-21. Correlation of Axial Dispersion Coefficient for Gases Flowing through Fixed Beds

$$N_{pea} = \frac{\bar{u} d_p}{E_z} = \frac{\bar{u}_i d_p}{E_{zi}} \qquad \bar{u}_i = \frac{\bar{u}}{\epsilon} \qquad E_{zi} = \frac{E_z}{\epsilon}$$

$$Re = \frac{\bar{u} d_p}{\nu} \qquad Sc = \frac{\nu}{\mathcal{D}}$$

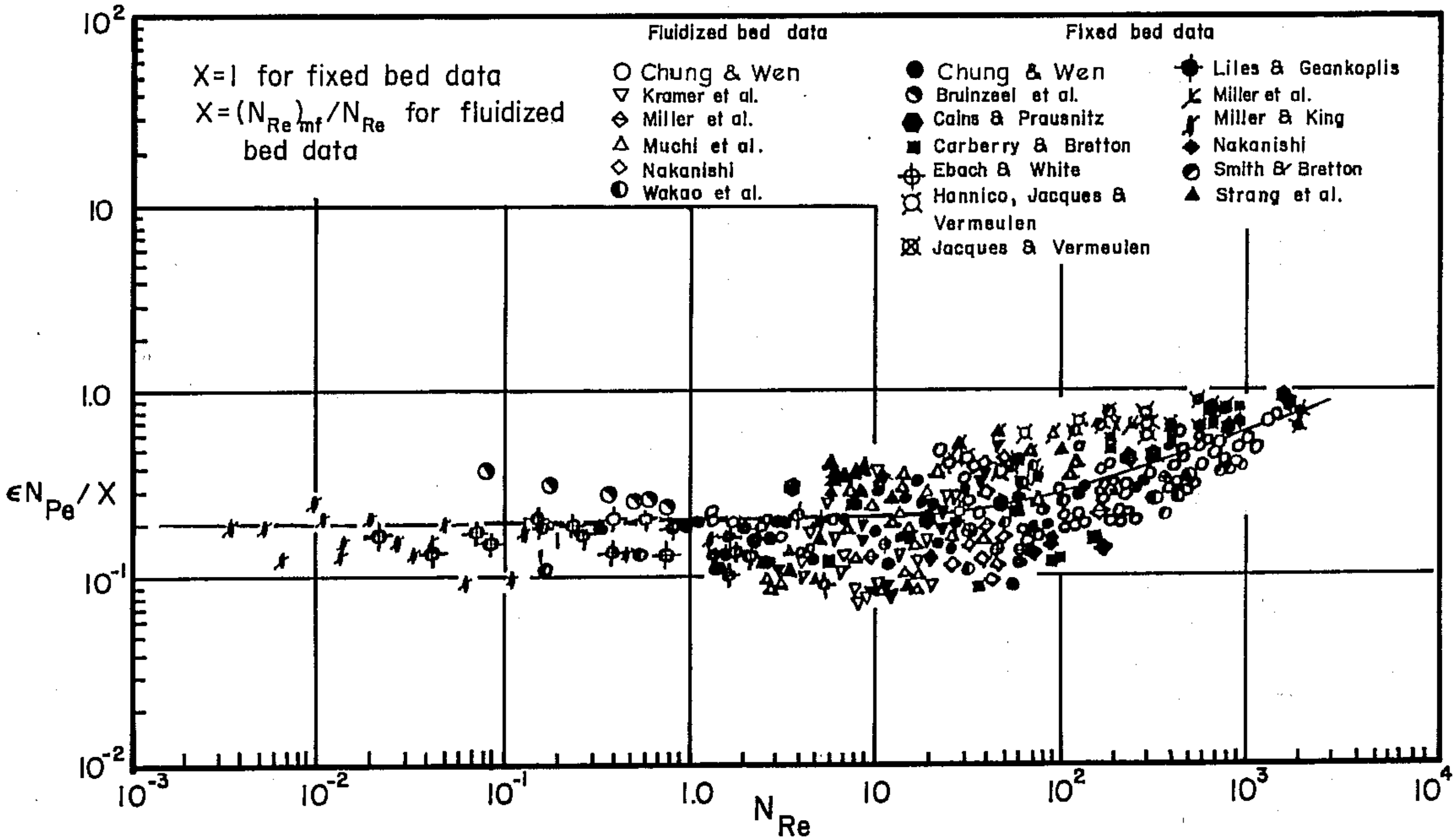

Fig. 5-19. A Correlation of Longitudinal Dispersion Coefficients of Liquid Phase Fixed Beds and Fluidized Beds in Terms of Peclet Number