ILLINOIS INSTITUTE OF TECHNOLOGY

Mechanical, Materials And Aerospace Engineering Department

MMAE SEMINAR

WEDNESDAY, SEPTEMBER 28, 2005
E-1 BUILDING – CRAWFORD AUDITORIUM
3:30 – 4:30 PM

Turbulent Pipe Flow and Why Moody Was Wrong

ALEXANDER J. SMITS

Department of Mechanical and Aerospace Engineering, Princeton University

e-mail: asmits@princeton.edu

The Moody Diagram has been used to estimate frictional losses in smooth and rough pipes since it was first proposed in 1944. Recent experiments at Princeton in fully-developed turbulent pipe flow have shown that many of the assumptions made in deriving this engineering guide are not correct. In particular, a detailed study of the velocity profile in a smooth pipe at very high Reynolds numbers has led to an improved correlation for the smooth pipe friction factor, and a careful examination of the behavior for rough surfaces demonstrates the shortcomings of the friction factor correlation used by Moody for transitionally rough surfaces.