

Abstract Submitted  
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**Evaluation of a universal transitional resistance diagram for pipes with honed surfaces** JAMES ALLEN, New Mexico State University, MICHAEL SHOCKLING, ALEXANDER SMITS, Princeton University — A method for evaluating a universal transitional resistance diagram for pipes that relates the pressure drop in the pipe to Reynolds number, as a function of relative surface roughness, is presented. The method assumes a universal wake function coupled with a logarithmic overlap region and a power fit in the viscous and buffer layer. Estimates can be made of the friction factor-Reynolds number relationship for arbitrary relative roughness. The size of the non-dimensional velocity shift as a function of roughness Reynolds number comes from the honed pipe data of Shockling, Allen & Smits[1]. Honed roughness demonstrates an inflectional behavior in the transitionally rough regime, much like sandgrain roughness, but the method proposed here applies to any given roughness behavior.

[1] Shockling, M.S., Allen, J.J. and Smits, A.J. “Roughness effects in turbulent pipe flow,” Submitted to *Journal of Fluid Mechanics*, (2005).

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