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**Relating turbulent friction and energy spectrum in rough-pipe flows** CARLO ZUNIGA ZAMALLOA, PINAKI CHAKRABORTY, NIGEL GOLDENFELD, GUSTAVO GIOIA, University of Illinois at Urbana-Champaign — The classical experiments on turbulent flows over rough walls date back to Nikuradse in 1933. Nikuradse reported measurements of friction factor ( $f$ ), or non-dimensional wall shear stress, as a function of the Reynolds number (Re) of the flow for pipes of six different values of roughness. A recent theory makes a mathematical link between the turbulent energy spectrum and the functional dependence of  $f$  on Re (PRL, 044502, 96, 2006). Here we perform experiments on rough pipes to test this mathematical link. To that end, we measure  $f$  vs Re as well as the attendant turbulent energy spectrum. Our experimental results are in good with the mathematical link predicted by the theory.

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