

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

The determination of turbulence-model statistics from the velocity-acceleration correlation STEPHEN POPE, Cornell University — In Reynolds-stress models, a primary unknown is the pressure–rate-of-strain; and, in velocity probability density function (PDF) models, a primary unknown is the conditional mean pressure gradient (conditional on velocity). Except from direct numerical simulations (DNS) of simple canonical flows, there is little information about these statistics. Currently, it is not possible to measure pressure with the necessary resolution, so there are no measurements of these important quantities. It is shown that essentially the same information can be obtained from the velocity-acceleration correlation and the Reynolds stresses. Since these correlations arise predominantly from the larger, energy-containing motions, they can be obtained experimentally (without Kolomorov-scale resolution), and from DNS, and from well-resolved large-eddy simulations (LES). In terms of the second moments of velocity and acceleration, expressions are given for the redistribution term in the Reynolds-stress equation, and for the drift term in the generalized Langevin model for the PDF.

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Date submitted: 29 Jul 2014

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