Turbulent Flow Simulations with the Julia Programming Language MANUEL F. SCHMID, University of British Columbia, MARCO G. GIOMETTO, Columbia University, MARC B. PARLANGE, Monash University — In turbulent flow simulations, there is little room for computational inefficiency. The resolution of a simulation and its time to completion are often limiting factors for the problems that can be studied numerically. At the same time, problem-specific extensions to the simulation code are often necessary. The Julia programming language promises to enable quick, iterative development in a friendly, high-level language while achieving a performance comparable to Fortran and C. We present a new code for direct numerical simulation of turbulent channel flows written in Julia, scaling to thousands of CPU cores. We compare its performance to a Fortran code with the same numerical approach and discuss advantages and drawbacks of the new code.

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