

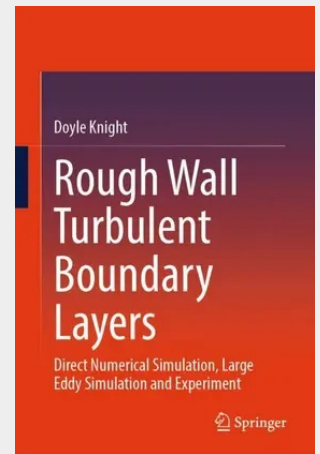
Rough Wall Turbulent Boundary Layers

Direct Numerical Simulation, Large Eddy Simulation and Experiment

The book presents a comprehensive summary of experiments and high-fidelity simulations (using Direct Numerical Simulation [DNS] and Large Eddy Simulation [LES]) of rough wall pipe and channel flows, and turbulent boundary layers from subsonic to hypersonic speeds. Although the field of rough wall turbulent boundary layers and rough wall turbulent pipe flow has been studied for nearly 200 years, there is no comprehensive summary of the experiments and high-fidelity simulations (LES and DNS) incorporating example results for each investigation. Dr. Knight further provides background information on turbulent boundary layers and pipe flow, together with a brief introduction to Direct Numerical Simulation and Large Eddy Simulation. A summary chapter describes the knowledge of the roughness function, examines the validity of Townsend's similarity hypothesis and details the available data of experimental and high-fidelity simulation turbulence statistics and understanding of the rough wall turbulence structure, illustrating the importance of the phenomena in aerodynamics, aerospace, and civil, environmental, and mechanical engineering.

- Shows the connection to aerodynamic drag on wings; efficiency of propellers, and pollutant dispersion in urban areas
- Examines high fidelity simulations (LES and DNS) of rough wall turbulent boundary layers, pipe, and channel flows
- Summarizes over 100 years of experimental results for rough wall turbulent boundary layers and rough wall pipe flow

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