Smits, Alexander J.; **McKeon, Beverley J.**; **Marusic, Ivan**

High-Reynolds number wall turbulence. (English) Zbl 1299.76002

Davis, Stephen H. (ed.) et al., Annual review of fluid mechanics. Vol. 43. Palo Alto, CA: Annual Reviews (ISBN 978-0-8243-0743-1/hbk). Annual Review of Fluid Mechanics 43, 353-375 (2011).

Summary: We review wall-bounded turbulent flows, particularly high-Reynolds number, zero-pressure gradient boundary layers, and fully developed pipe and channel flows. It is apparent that the approach to an asymptotically high-Reynolds number state is slow, but at a sufficiently high Reynolds number the log law remains a fundamental part of the mean flow description. With regard to the coherent motions, very-large-scale motions or superstructures exist at all Reynolds numbers, but they become increasingly important with Reynolds number in terms of their energy content and their interaction with the smaller scales near the wall. There is accumulating evidence that certain features are flow specific, such as the constants in the log law and the behavior of the very large scales and their interaction with the large scales (consisting of vortex packets). Moreover, the refined attached-eddy hypothesis continues to provide an important theoretical framework for the structure of wall-bounded turbulent flows.

For the entire collection see [Zbl 1208.00024].

Reviewer: Reviewer (Berlin)

MSC:

76-02	Research exposition (monographs, survey articles) pertaining to fluid mechanics	Cited in **101** Documents
76D10	Boundary-layer theory, separation and reattachment, higher-order effects	
76D17	Viscous vortex flows	

Keywords:

boundary layers; channel flow; pipe flow; coherent motions; turbulence structure

Full Text: DOI