Helical structure of longitudinal vortices embedded in turbulent wall-bounded flow CLARA VELTE, MARTIN HANSEN, VALERY OKULOV, Technical University of Denmark — Embedded vortices in wall-bounded flow over a flat plate, generated by a passive rectangular vane-type vortex generator with variable device angle β to the incoming flow in a low- Reynolds number flow ($U_\infty = 1.0\,ms^{-1}$), have been studied using Stereoscopic PIV in the respect of helical symmetry. The vortices possess helical symmetry, allowing the flow to be described in a simple fashion. A model describing the flow has been utilized, showing strong concurrence with the measurements. Through the swirl parameter it was possible to predict the helical pitch. The pitch, vortex core size, circulation and the advection velocity of the vortex all vary linearly with β. One can thereby determine the axial velocity induced by the helical vortex as well as the swirl for a given β. This also simplifies theoretical studies, e.g. to understand and predict the stability of the vortex and to model the flow numerically.

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