

Abstract Submitted
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Geometrical structure and topology of pressure Hessian in the turbulent boundary layer¹ SERGEI CHUMAKOV, Center for Turbulence Research, Stanford University, CALLUM ATKINSON, Laboratory for Turbulence Research in Aerospace and Combustion, Monash University, Australia, IVAN BERMEJO-MORENO, Center for Turbulence Research, Stanford University, JULIO SORIA, Department of Mechanical and Aerospace Engineering, Monash University, Australia, XIAOHUA WU, Royal Military College of Canada — Pressure Hessian $H_{ij} = P_{,ij}$ plays an important role in the evolution equations for the invariants of the deformation tensor $A_{ij} = u_{i,j}$ and its symmetric part S_{ij} . The properties of H_{ij} need to be understood in order to develop a mathematical model for the evolution of invariant quantities. In order to develop a full dynamical model for H_{ij} , there is a need to study and understand the full effect of the H_{ij} tensor on the Lagrangian dynamics of the invariants. This type of study requires well-resolved data to evaluate all the right-hand side terms in the evolution equations. Attempts to study the properties of H_{ij} via its invariants for the case of decaying isotropic turbulence and a temporally evolving plane wake can be found in the current literature. We present the a priori study of properties of H_{ij} based on the results from the DNS of the fully developed turbulent boundary layer over a smooth flat plate, originally performed by Wu and Moin.

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