Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

On the Interaction of Unsteady Suction and Turbulent Flat Plate Boundary Layer BAR MIZRAHI, AVRAHAM SEIFERT, Tel Aviv University — This paper describes the interaction of unsteady suction created by the new oscillatory suction (OSUB) actuator with a turbulent, flat plate boundary layer. Unsteady suction is imposed on the boundary layer from four discrete holes in the plate in the transitional region of the boundary layer. The boundary layer is first characterized without excitation then two magnitudes and two frequencies for each magnitude are imposed. The resulting flow is very effectively modified by the imposed suction. Hot-wire scans of planes parallel to the wall at two different heights and full boundary layer velocity profiles along selected rays from the origin of the disturbances reveal a fascinating 3D complex yet quite coherent patterns. Phase-locked analysis decomposes the controlled flow field and reveals the unsteady flow created by the unsteady suction. The disturbances are compared to those created by discrete steady suction through the same array of four spanwise holes and reveal the parameter range in which unsteady suction has significant benefits as compared to steady suction.

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Date submitted: 31 Jul 2019 Electronic form version 1.4