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The Unsteady Suction Actuator[1] NIMROD SHAY, BAR MIZRAHI1, OFEK DRORI, ARIEL YANIV, AVRAHAM SEIFERT, Tel Aviv University —
Steady suction is known to be significantly more effective than steady blowing for boundary layer separation control. Pulsed blowing is known to be significantly more effective than steady blowing, owing to the instability and favorable timescales imposed by unsteady 3D vorticity components created by a suitable device. Recently it was shown that unsteady suction can be more effective even when compared to steady suction. This paper describes the development and characterization of a new fluidic device, capable of creating unsteady suction with no moving parts. The device uses at least one fluidic oscillator and at least one ejector to create unsteady suction. Detailed numerical and experimental rapid prototyping techniques were used and the results of the device characterization in still fluid are described. It is shown that the new device can create the required output signals for external flow separation control using relatively low input mass flux and low power. Further to its development, it was already tested interacting with a turbulent boundary layer and compared directly to other flow control devices in keeping an airfoil boundary layer attached. [1] Seifert, A. and Pack, L.G. "Active flow separation control on wall-mounted hump at high Reynolds numbers," AIAA J., vol. 40, pp. 1363–1372, 2012. [2] Morgulis, N. and Seifert, A., "Fluidic flow control for improved performance of small Darrieus type wind turbines," Wind Energy, Volume 19, Issue 9, September 2016, Pages 1585-1602.

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