

Abstract Submitted
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Measurement of the flow past a cactus-inspired cylinder GHANEM

F. OWEIS, ADNAN M. EL-MAKDAH, Mechanical Engineering, American University of Beirut, Beirut, Lebanon — Desert cacti are tall cylindrical plants characterized by longitudinal u- or v-shaped grooves that run parallel to the plant axis, covering its surface area. We study the wake flow modifications resulting from the introduction of cactus-inspired surface grooves to a circular cylinder. Particle image velocimetry PIV is implemented in a wind tunnel to visualize and quantify the wake flow from a cactus cylinder in cross wind and an equivalent circular cylinder at $Re \approx 10^5$. The cactus wake exhibits superior behavior over its circular counterpart as seen from the mean and turbulent velocity profiles. The surface flow within the grooves is also probed to elucidate the origins of the wake alterations. Lastly, we use simple statistical analysis based only on the wake velocity fields, under the assumption of periodicity of the shedding, to recover the time varying flow from the randomly acquired PIV snapshots.

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