

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Time resolved measurements of vortex-induced-vibration of a tethered sphere RENE VAN HOUT, ALEXANDER KRAKOVICH, ODED GOTTLIEB, Technion-Israel Institute of Technology — Time resolved, high-speed PIV measurements were performed to study the spatio-temporal dynamics of a tethered, stainless steel sphere ($D = 5/16''$, $m^*=7.86$, $L^*=2.90$), mounted in a water channel and exposed to uniform, free stream velocities up to 0.64 m/s. To study the coupled interaction between vortex and sphere dynamics, we performed measurements in a horizontal plane, intersecting the sphere's center. Below the threshold velocity for which vortex induced vibration occurs, wake dynamics are those of a stationary sphere. As the free stream velocity increases, modes of periodic and non-stationary intermittent sphere dynamics are observed in the plane transverse to the flow. We simultaneously track the sphere and vortex centers, the latter through maximum values of the swirling strength. Vortex tracking starts at the sphere interface through the separation point and away from the sphere. Also, time dependent turbulent stresses, terms of the TKE production are presented. This information together with the sphere's motion itself reveals clues to the intricate, coupled flow-structure interaction.

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Date submitted: 06 Aug 2009

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