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PIV Analysis of Prandtl's Flow Visualization Movies CHRISTIAN WILLERT, JUERGEN KOMPENHANS, German Aerospace Center, MORTEZA GHARIB, Caltech — Probably some of the oldest time-resolved PIV image sequences still available today were recorded on film during the late 1920's and early 1930's by Prandtl and his colleagues Tietjens and Müller using free surface water flumes at the Kaiser-Wilhelm-Institute for Fluid Research (Göttingen), now the Max Planck Institute for Self Organisation. Recorded at 20 frames per second the films visualize the process of unsteady flow separation and vortex generation on surface piercing objects such as airfoils or cylinders. The visualization was achieved by means of small particles (aluminum powder, ferrous mica or lycopodium powder) scattered on the water surface. Illumination from above resulted in high contrast images of the random particle distribution that are very well suited for PIV analysis. Modern PIV software is used to process digitized versions of the films, made available by the "Institut für wissenschaftlichen Film" (www.iwf.de) in Göttingen. In addition to the surface flow field the time evolving vorticity field and other quantities can now be visualized which by itself shows the importance of carefully documenting and archiving valuable data.

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