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Common-optical axis Fourier transform profilometry for water surface waves. MAHDI GHADIRI, ROUSLAN KRECHETNIKOV, University of Alberta — The Fourier transform profilometry – a single-shot optical profilometric measurement of surface deformation – has been widely used to visualize and measure water surface waves. This well-known method is based on an optical system composed of a video projector displaying a fringe pattern on the surface and a camera recording this pattern as the reference image. The deformed fringe pattern following deformation of the surface later is then recorded and compared to the reference image in order to produce a phase map, from which the height of the deformed surface is reconstructed through a phase-to-height relation. The biggest challenge encountered while applying this method for water surface is the light reflection which previously has been partially treated by enhancing the water light diffusivity with the addition of Titanium dioxide. As part of the effort to improve the accuracy and practical applicability of the method, in this talk we will present a new implementation of a common-optical axis geometry along with an appropriate phase-height relation. Furthermore, in the case of water surface waves, we introduce a proper light filtration, which removes all the reflections remaining after addition of Titanium dioxide. The proposed technique provides an order of magnitude improvement in the accuracy of detecting and reconstructing the surface deformation, which is crucial for studying small amplitude waves and bifurcation phenomena.

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