

Surface Water Wave Topography Construction using Free Surface Synthetic Schlieren Method for Ripple Tank Wave Phenomena Demonstration

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The ripple tank is a popular water wave phenomena demonstration tool for secondary school students. The projected wave images are observed in bright - dark patterns on a screen. This tool, however, falls short in presenting the amplitude of the waves which is another important parameter in explaining the wave phenomena. The free surface synthetic schlieren (FS-SS) method presents an immense technical tool for solving this problem. FS-SS is an optical method based on light refraction in determining the surface gradient field from the motion of a random dot pattern when the water surface is perturbed. The surface height of the wave is constructed using the inverse gradient operation on the displacement gradient field of the random dot pattern. In this work, Wave propagation, reflection, diffraction, and interference pattern surface construction were performed to visualize wave phenomena in 3D.

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