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Microscopic Holography for flow over rough plate[1] SIDDHARTH TALAPATRA, JIARONG HONG, YUAN LU, JHU PhD student, JOSEPH KATZ, Professor, JHU — Our objective is to measure the near wall flow structures in a turbulent channel flow over a rough wall. In-line microscopic holographic PIV can resolve the 3-D flow field in a small sample volume, but recording holograms through a rough surface is a challenge. To solve this problem, we match the refractive indices of the fluid with that of the wall. Proof of concept tests involve an acrylic plate containing uniformly distributed, closely packed 0.45mm high pyramids with slope angle of 22° located within a concentrated sodium iodide solution. Holograms recorded by a 4864 x 3248 pixel digital camera at 10X magnification provide a field of view of 3.47mm x 2.32mm and pixel resolution of 0.714 μm. Due to index matching, reconstructed seed particles can be clearly seen over the entire volume, with only faint traces with the rough wall that can be removed. Planned experiments will be performed in a 20 x 5 cm rectangular channel with the top and bottom plates having the same roughness as the sample plate.

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Siddharth Talapatra

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