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Index-Matched PIV Measurements of Turbulence inside a Fractal-Tree Canopy[1] KUNLUN BAI, JOSEPH KATZ, CHARLES MENEVEAU, Johns Hopkins University — Turbulence inside vegetation canopies has a significant impact on various physical and biological processes such as forest microclimate, rainfall evaporation distribution and climate change. In most scaled laboratory experimental studies, the canopy element models, for example vertical strips or rods, typically have only one or a few characteristic length scales. However, natural canopies usually contain multiple scales with branches and sub-branches. In this study, a model canopy is constructed by twelve fractal-like trees. Each tree contains five generations with three branches and a scale reduction factor 1/2 at each generation and fractal similarity dimension of Df $\sim$ 1.58. In order to capture the flow fields inside the trees and between the branches, an index-matching technique is applied. Two trees are made by clear urethane plastic with refractive index about 1.49. The solution running in the facility is carefully prepared by mixing Sodium-Iodine in distilled water to match the refractive index of the urethane-plastic trees. In this talk, experiments will be discussed in detail and measured velocity and turbulence statistics inside and above the canopy will be presented and discussed.

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Charles Meneveau
Johns Hopkins University

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