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3-D Fluorescent Imaging of Fluid Flow in Rock WILLIAM SHAIN, Physics Department, Boston University, HARI PAUDEL, THOMAS G. BIFANO, Mechanical Engineering, Boston University, BENNETT GOLDBERG, Physics Department, Boston University — Imaging deep inside porous media is a classical problem that manifests in enhanced oil recovery, geological CO₂ storage, and many other fields. However, the strong optical scattering from the pore structure limits traditional microscopy techniques to a few pore lengths from the surface. Super-penetration Multi-Photon Microscopy (S-MPM) is a technique to image through strongly scattering media by using coherent optimization of the phase front of incident light to compensate for the scattering in the material. We demonstrate that we can use S-MPM to create high-quality images of fluorescent beads through 40 μ m of calcite rock samples, and we plan to use our imaging capabilities to measure the flow characteristics of water and oil through porous rock.

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