Measurement of the refractive index of highly turbid media
SAMIR BALI, ERIC WILLIAMS, SARABJOT MAKKAR, MIAO DONG, LALIT BALI, Dept. of Physics, Miami University — We demonstrate a first simultaneous measurement of the real and imaginary parts of the refractive index of a highly turbid medium (scattering coefficient $> 200\text{cm}^{-1}$; by comparison, milk’s scattering coefficient in the visible and near-infrared frequencies lies between $40\text{cm}^{-1}$ and $125\text{cm}^{-1}$ depending on fat content). We achieve this by observing the real-time reflectance profile of a divergent laser beam made incident on the surface of the turbid medium. We find that the reflectance data is well described, for the first time without any empirical fit-parameters, by Fresnel theory that correctly includes the effect on total internal reflection of angle-dependent penetration into the turbid medium.