REDUCED ORDER MODELING OF TIME-DEPENDENT REFLECTANCE PROFILES FROM PURELY SCATTERING MEDIA

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ABSTRACT. Foams form during a wide variety of industrial processes. Due to the widespread existence and importance of foam, inverse techniques for characterizing industrial foams are of interest. An essential element in the inverse methods used to study foam layers is a model of the time-dependent reflectance of a laser pulse by the layer. Monte Carlo methods may be used to accurately model the reflectance, but these methods are computationally expensive. Computationally efficient methods based on the diffusion approximation have been developed, but this approach is not sufficiently accurate in many cases of interest. Therefore, a computationally efficient and robust method is desirable. This paper presents a computationally efficient method for modeling the time-dependent reflectance of a laser pulse from non-absorbing, scattering plane layer that is based on reduced order modeling techniques. The accuracy of the proposed method is demonstrated by comparing reflectance profiles for randomly selected foam layer properties with corresponding profiles that were generated from Monte Carlo simulations.