Iterative Blind Deconvolution Algorithm for Deblurring PSP Image of Rotating Surfaces[1] ANSHUMAN PANDEY, JAMES GREGORY, The Ohio State University — Fast Pressure-Sensitive Paint (PSP) is used in this work to measure unsteady surface pressures on rotating bodies, with iterative image deblurring schemes being developed to correct for image blur at high rotation rates. A significant amount of rotational blur can occur in PSP images acquired in the lifetime mode when the time scale of luminescent decay is long relative to the rotational speed. Image deblurring schemes have been developed to address this problem, but are not currently able to handle strong pressure gradients. Since the local point spread function at each point on the rotor depends on the unknown pressure, restoring such an image is a spatially-varying blind deconvolution problem. An iterative scheme based on the lifetime decay characteristics of PSP has been developed for restoring this image. The scheme estimates the spatially-varying blur kernel without filtering the blurred image and then restores it using classical iterative regularization tools. The resulting scheme is evaluated using computationally-generated pressure fields with strong gradients, as well as experimental data with strong gradients in luminescent lifetime due to a nitrogen jet. Factors such as convergence, image noise, and regularization-iteration count are studied in this work.

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