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High speed Infrared imaging method for observation of the fast varying temperature phenomena REZA MOGHADAM, KAMBIZ ALAVI, University of Texas at Arlington Department of Electrical Engineering, BAOHONG YUAN, University of Texas at Arlington Department of Biomedical Engineering — With new improvements in high-end commercial R&D camera technologies many challenges have been overcome for exploring the high-speed IR camera imaging. The core benefits of this technology is the ability to capture fast varying phenomena without image blur, acquire enough data to properly characterize dynamic energy, and increase the dynamic range without compromising the number of frames per second. This study presents a noninvasive method for determining the intensity field of a High Intensity Focused Ultrasound Device (HIFU) beam using Infrared imaging. High speed Infrared camera was placed above the tissue-mimicking material that was heated by HIFU with no other sensors present in the HIFU axial beam. A MATLAB simulation code used to perform a finite-element solution to the pressure wave propagation and heat equations within the phantom and temperature rise to the phantom was computed. Three different power levels of HIFU transducers were tested and the predicted temperature increase values were within about 25% of IR measurements. The fundamental theory and methods developed in this research can be used to detect fast varying temperature phenomena in combination with the infrared filters.

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