

"Laser Based Bond Evaluation (LBBE) System"

The use of short-pulsed laser optics technology is an effective and non-destructive technique that can be used to detect abnormalities within various materials. One research area that can benefit from such technology is the thermal protection system of the Space Shuttle Orbiter. The tiles of the thermal protection system (TPS) are reusable, although after multiple flights debonding often occurs. As listed as one of the high priority tasks of the NASA/KSC mission, there is a great need for a process to test the TPS tiles so that the reliability of the bonds will not be sacrificed.

Short-pulsed laser technology will provide a methodology to non-destructively detect the location and degree of debonding by the changes in light scattering that will occur due to the variation of optical properties within the debonding region. A tool designed of this technology will be developed so that the TPS tiles can be scanned before and after flights to determine the condition of the bonds on the Space Shuttle and Orbital Vehicles.

Dr. Kunal Mitra has identified this process and begun small scale research on this topic. It is my goal to continue the research along with his guidance and develop this much needed Laser Based Bond Evaluation (LBBE) System. With fellowship money from the Florida Space Grant Consortium I will be able to perform the research that I'm truly passionate about, while having the opportunity to finish my Master's Degree, and ultimately make an impact on the future and safety of the space program.

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