



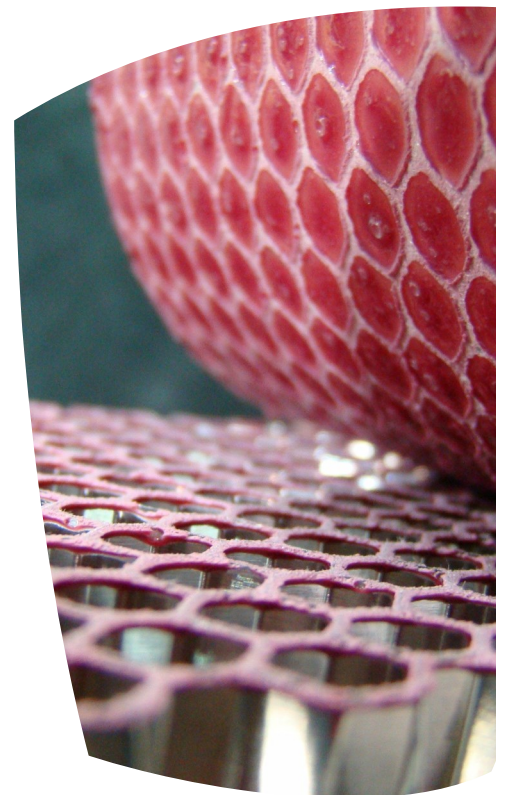
Presented By:
David Hui, Ph.D.
Professor
Mechanical Engineering
University of New Orleans

Distinguished Civil Engineering *Seminar*

Thursday, April 21st, 2016
MDEA
4:00PM to 4:50PM

Composites Under Harsh Environment: Civil & Aerospace Engineering Perspectives

The work presents an overview of the current state of the art in low temperature effects on materials in terms of durability and safety of vehicles. Susceptibility of composites to failure at low temperature is a critical issue for the aerospace industry. Spacecrafts operate at temperatures well below -200°C . High altitudes aircrafts routinely fly at -70°C to -100°C . These low temperatures result in two competing effects on composite stiffness. One beneficial effect involves increased stiffness because the polymer matrix would harden at low temperature. The other detrimental effect involves increased thermally-induced stress, which produces microcracks in matrix, which in turn, reduces the overall stiffness of the composites. These two competing beneficial-detrimental phenomena at the microstructure level have been studied for decades, but a quantitative understanding of the interplay of these two effects has continued to elude the researchers. Additional complexities arise when the stiffness increase effect is considered because of high strain rate loading. Long term exposure to cyclic or vibration can again reduce the stiffness. The competing effects for fatigue of fiber-reinforced polymer composites at low temperatures will be presented. Emphasis will be on civil engineering structural and other involving earthquake applications, orthogrids, FRP rebars, sandwich structures, guardrails, piers and structural members.



Dr. David Hui is Professor of Mechanical Engineering and Director of Composites Materials Research Laboratory at University of New Orleans. He received his Ph.D. from University of Toronto in Aerospace Engineering, and Master of Science from Massachusetts Institute of Technology. Dr. Hui has edited over 40 widely cited books. He has served as founder and editor-in-chief of one of the most prestigious journals in composite materials, Composites B Engineering journal. Dr. Hui is the Chairman of ICCE. Dr. Hui has conducted approximately 4 million US dollar funded research on composites materials and nano-materials, mostly for mechanical/aerospace engineering and ship structures applications. Dr. Hui has co-authored over 220 SCI journal publications, and these papers have received over 3000 citations from ISI web of knowledge. Currently, He serves on over 40 technical committees or editorial boards, consisting of over 2000 respected scientists on specific diverse fields of materials or nano science. One of Dr. Hui's outstanding contributions in research lies in the modeling of penetration of composite materials using the energy partition model and functional graded approach to enhance the durability and safety of engineering structures under harsh environments. His pioneered research on the mechanisms of degradation of materials under low temperatures on composites has resulted in enormous improvement in the safety of engineering structures. Prof. Hui is the recipient of numerous national and international prestigious awards.