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# The Key Role of Heat Transfer Analysis in Energy Systems Research



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### ABSTRACT:

Heat transfer plays a significant role in many applications. In this presentation, an overview of heat transfer applications based research problems are presented. The goal is to communicate how important heat transfer is and the need for measurements in evaluation of design solutions. Thermal design involves a combination of analytical, computational, and experimental tools. Detailed analytical, computational, and experimental techniques are combined to problem specific unique solutions. Problems in gas turbines, electronic cooling, thermoelectric generation are presented with interested heat transfer measurements and their impact in those problems. Some of these solutions will demonstrate the complexity of the problem and the approach to a solution.

### BIOGRAPHY:

Dr. S. V. Ekkad is the Department Head and RJ Reynolds Professor in the Mechanical & Aerospace Engineering Department at North Carolina State University since September 2017. He previously served as the Associate Vice President for Research Programs at Virginia Tech. He also held the title of Rolls-Royce Commonwealth Professor for Aerospace Propulsion Systems at Virginia Tech. He was also the Founder and Director of the Rolls-Royce University Technology Center for Advanced System Diagnostics at Virginia Tech, one of 30 centers around the world, prior to joining NC State. He was in the Mechanical Engineering department at Virginia Tech from August 2007 to September 2017 after 9 years at LSU and 2 years at Rolls-Royce Allison Engine Company in Indianapolis. He received his Ph.D. from Texas A&M University and M.S. from Arizona State University. He has over 25 years of experience in heat transfer related research. He has published over 250 journal & conference articles, three patents and co-authored a book and three book chapters. He currently has funding from Solar Turbines, and Trilocus Aerospace Systems/Chromalloy. He has been working on gas turbine cooling and heat transfer issues since 1989 including a stint as a design engineer at Rolls-Royce, Indianapolis before his academic career. Dr. Ekkad has also served as a summer faculty fellow at AFRL, Dayton in 2003. He is well known for his contributions to heat transfer experimental methods. In 2004, he received the inaugural ASME Bergles/Rohsenow Young Investigator in Heat Transfer Award for significant contributions to the field of heat transfer by a researcher under the age of 36. He is also the Editor-in-Chief for the ASME Journal for Thermal Science and Engineering Applications. He received the 2022 AIAA Air Breathing Propulsion Award and will receive the 2022 ASME Heat Transfer Memorial Award.