Mechanical Engineering Department Seminar

3:35pm March 8, 2017
1130 Mechanical Engineering
111 Church Street SE, Minneapolis, MN 55455

Overview of Concentrating Solar Power And Research Needs

Clifford K. Ho

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This presentation will provide an overview of Concentrating Solar Power (CSP) and research at Sandia National Laboratories to increase performance and reduce costs of various CSP components. CSP uses a large array of mirrors to focus sunlight onto a receiver containing a heat-transfer fluid, which absorbs the high heat flux (~100 – 1000 times the sun's irradiance). A heat engine (e.g., Rankine cycle, Stirling cycle, Brayton cycle) then converts the heat to mechanical work to generate electricity. CSP systems can produce utility-scale power (hundreds of megawatts) and can store excess thermal energy for energy production at night or when the sun is not shining. The ability to store large amounts of energy cheaply and reliably gives CSP a significant advantage over other intermittent renewable energy sources such as wind and photovoltaics. Research needs in the areas of solar collectors, receivers, and thermal storage will be discussed.

Bio: Dr. Cliff Ho is a Distinguished Member of the Technical Staff at Sandia National Laboratories, where he has worked since 1993 on problems involving solar energy, water safety and sustainability, heat- and mass-transfer processes in porous media, and microchemical sensor systems for environmental monitoring. Dr. Ho has authored over 200 scientific papers, including 10 patents, and he is an author and co-editor of two books. He received an Outstanding Professor Award at the University of New Mexico in 1997, and he received the national Asian American Engineer of the Year Award in 2010. Dr. Ho received an R&D 100 Award in 2013 for his development of the Solar Glare Hazard Analysis Tool, and another R&D 100 Award in 2016 for the development of the Falling Particle Receiver for Concentrated Solar Energy.

Dr. Ho received his B.S. in Mechanical Engineering from the University of Wisconsin–Madison in 1989, and his M.S. and Ph.D. degrees in Mechanical Engineering from the University of California at Berkeley in 1990 and 1993.