



University of Colorado **Boulder**

Department of Civil, Environmental, and Architectural Engineering

Building Systems Engineering Seminar

Inverse Design of Indoor Environment by CFD-based Optimal Methods

Dr. Qingyan “Yan” Chen

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Wednesday, October 9th, 2019

2:30 – 3:30 P.M.

ENVD 120 (Coffee and Snacks provided)

ABSTRACT

The inverse design approach is new to indoor environment research and design community, though it has been used in other industries including automobile and airplane design. Inverse design concept uses the desired indoor environment as the design objective and inversely determines the systems required to achieve the objective. This seminar discusses a number of backward and forward optimal methods for inverse design. Backward methods can be used to identify contaminant sources in an enclosed environment. However, these methods cannot be used to inversely design a desired indoor environment. Forward methods, such as the computational-fluid-dynamics (CFD)-based genetic algorithm method, the CFD-based adjoint method, and the CFD-based proper-orthogonal-decomposition method, show the promise in the inverse design of airflow and heat transfer in an enclosed environment. This seminar will show some exciting examples of inverse design of indoor environment, discuss the pros and cons of each design method, and indicate the best approach in using the methods for inversely designing indoor environment.

BIOGRAPHY



Dr. Qingyan “Yan” Chen is the James G. Dwyer Professor of Mechanical Engineering at Purdue University. He serves also as the Editor-in-Chief of the international journal “Building and Environment”. Chen was the Principal Director of FAA Center of Excellence for Airliner Cabin Environmental Research. Dr. Chen has published three books and over 450 journal papers, book chapters and conference papers and has been invited to deliver over 170 lectures internationally. Google Scholar shows that his journal publications have been cited by more than 14,000 times and his H-index is 65. Dr. Chen received the Distinguished Achievement Award from International Building Performance Simulation Association (IBPSA), the John Rydberg Gold Medal from the Scandinavian Federation of Heating, Ventilating and Sanitary Engineering Associations, and the Willis J. Whitfield Award from the Institute of Environmental Sciences and Technology, Distinguished and Exceptional Service Awards from American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) and CAREER award from the National Science Foundation. He is a fellow of ASHRAE and International Society of Indoor Air Quality.

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