



American Institute of
Aeronautics and Astronautics
Dayton-Cincinnati Section

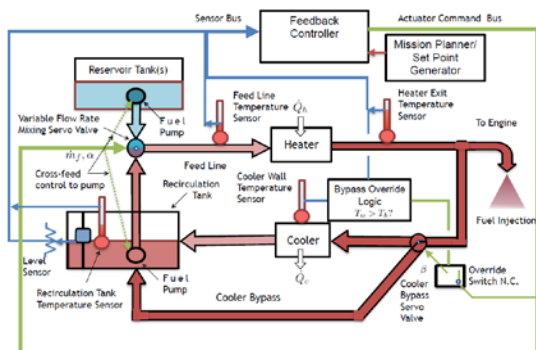
Lunch 'n' Learn

Fuel Flow Topology and Control for Extending Aircraft

Thermal Endurance

Guest Speaker:
Dr. David Doman

Friday, 21 April 2017
11:45 AM



Abstract: The effect of fuel flow topology and control on the thermal endurance of aircraft that use fuel as a heat sink will be presented. Differential equations are derived that describe the behavior of recirculated fuel flows within a proposed dual tank topology that features a designated recirculation tank. Equations for a single tank flow topology are also presented. It is shown that a simple switching controller acting on a dual tank system results in aircraft thermal endurance that is greater than or equal to that of a single tank configuration when the aircraft engine and fuel system are driven at a constant mass flow rate. More sophisticated examples are considered for a fighter aircraft mission where the endurance achieved by single tank systems are compared to the endurance of a dual tank system operating under closed loop control. Simulation results are used to quantify benefits that can be obtained by a judicious selection of closed loop control strategy and fuel flow topology. The results show that a controlled dual tank fuel flow topology can increase aircraft thermal endurance over that which can be attained by a single tank topology.

Speaker: David B. Doman, Ph.D. , Principal Aerospace Engineer and Director of Control Science Center, Aerospace Systems Directorate, Air Force Research Laboratory. Dr. Doman is a Principal Aerospace Engineer at the Air Force Research Laboratory where he serves as the Director of the AFRL Control Science Center. He has been the author or co-author of over 160 widely cited scholarly publications including journal articles, technical papers, reports, and book chapters. He has been awarded 5 U.S. patents and has an additional 3 pending. He served as an Associate Editor for the Journal of Guidance, Control and Dynamics for 9 years and he served a two-year term as the Chair of the AIAA Guidance, Navigation, and Control Technical Committee. He is the recipient of numerous awards including the Royal Aeronautical Society Silver Medal and the USAF John L. McLucas award for Basic Research. He is a Fellow of the AIAA, IEEE, and AFRL.

Location

China Garden Buffett
Airway Center
112 Woodman Drive
Dayton OH 45432

Lunch

Buffett style, all-you-
can-eat Asian cuisine.

