The noise generated by high performance military aircraft engines has been a challenge for engineers and scientists. The dominant source of noise in these engines is that generated by turbulence in high speed, high temperature jet exhaust. It is the turbulent mixing of this high velocity flow with the surrounding air that contributes to jet noise emission. Jet noise research is a hybrid problem involving multiple fields such as aerodynamics, turbulence, and acoustic. This general talk starts from the jet noise background and then introduces the preliminary results of on-going research projects. These include the latest development of the jet noise reduction techniques and the twin-jet study. The nozzle fluidic insert was developed for the supersonic jet noise reduction and the current finding shows up to 6 dB noise reduction in the peak noise emission direction and around 3 dB reduction in the dominant shock noise emission direction. The twin impinging jets research focuses on the study of the pressure/velocity field survey around the lift plate and ground plate of the F-35 Lightning II fighter aircraft. The active flow control technique by using plasma actuators has shown the control authority over the jet plumes. The noise emission level can be modulated if one can actively control the noise generation mechanism. The preliminary results of twin-jet nozzle equipped with the plasma actuators will be discussed. A brief review of other jet noise studies will also be mentioned in the talk.

Dr. Kuo is a Postdoctoral Researcher in the Aerospace Research Center at The Ohio State University. He is mostly focus on the experimental investigation and analysis for noise generation/radiation and suppression mechanisms in supersonic jets. His research interests are categorized as understanding the noise generation mechanisms of supersonic jets, investigating the flow properties of supersonic jets, studying the interaction between the nozzle wall and supersonic flow, developing subsonic/supersonic jet noise reduction devices, and adopting innovative non-intrusive techniques for jet noise analysis. He is a member of the American Institute of Aeronautics and Astronautics.