Despite periodic predictions of its demise, wind tunnel testing and research remains an active and key element of engineering development and scientific inquiry. Fundamentally, this is because the mathematical equations governing aerodynamics remain unsolved in the exact sense for most practical engineering applications. The best computer based solution methods we do have depend on models, which in turn depend on physical approximations and correlations obtained from experimental data. These accuracy of these models and their range of applicability is unknown a priori and thus need to be continuously calibrated in situations that, as close as possible, match their intended application. This is particularly true in the area of aeroacoustics where sound can be generated by subtle features of the complex turbulent flow dynamics. The generation of sound by flows is an important component of the environmental impact of everything from wind turbines to aircraft engines, as well as the stealth of submarines to helicopters.

In the last few years the Virginia Tech Stability Wind Tunnel has become a world leader in aeroacoustic testing. The reason for this rapid rise is the invention of a unique solution of how to configure a wind tunnel to generate aerodynamics that closely simulates applications while maintaining an environment where flow generated sound can be easily detected and accurately measured. To date this new development has been used, primarily, for the testing of wind turbine blade aeroacoustics and for research into flow generated noise in naval applications. Commercial/government interest has generated new opportunities and ideas for education. So, is this at some level a black swan? If so, what diverse and innovative applications are there that we haven’t thought of yet? What will be the next development(s) that will make this wind tunnel, or all wind tunnels, redundant?

Facilitator: William Devenport