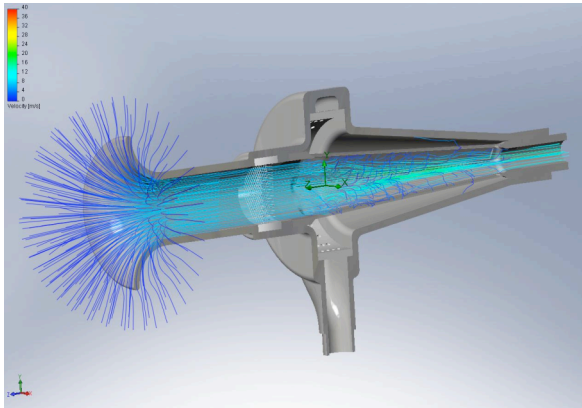


AAAR Abstract E-TFF

An air-to-air concentrator is described, that operates by charging aerosols drawn into the device and removing a portion of air through a charged screen into a “major flow”. This results in concentration of the particles into a much smaller “minor flow.” The inlet is designed to provide sufficient charge to the target particles to overcome the air velocity through the major flow screen. This process potentially can greatly multiply the concentration of aerosols with diameters from 0.5 microns up to 10 microns in the minor flow.

The parameters controlling the enrichment of particles in the gas stream include the initial charge taken up by the particles, the repelling force developed at the screen, and the design of the system to optimize the collection of particles into the minor flow. Many aerosol collection/detection systems could be adapted to use pre-concentration of aerosols to improve their performance. Scaling has been demonstrated from 5-400 LPM (major flow) and 0.25-190 LPM (minor flow).



Design of an Aero E-TFF begins with determination of the system flow rate and concentration required. Then, a CFD model is constructed, the device is built to specs and demonstrated at the desired flow rates and particle sizes to verify its performance. Several Aero E-TFFs have been built and tested for aerosol concentration. Ongoing research in the factors controlling the ability to control and improve the concentration is being conducted and will be presented. Concentrating aerosols prior to collection in a collection/detection system reduces the time to detect or lowers the detection limit. A key challenge is controlling and optimizing the forces that define the concentration factor achievable by the device, with a goal of 20 to 100 X enrichment of target particles.