Voronoi polygons and self-consistent technique used to compute the airflow resistivity of randomly placed fibers in glass wool - DTU Orbit (09/12/2018)

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Sound in glass wool propagates mainly in the air between glass fibers. For sound waves considered here, the distance between fibers is much smaller than the wavelength. Therefore, the sound velocity and attenuation can be computed from an effective mass density and compressibility. For simple harmonic waves at low frequencies, the effective mass density is determined by the friction between air and fibers. The friction is described by the airflow resistivity, which depends on frequency, but for frequencies below 1000 Hz in glass wool with density 15–30 kg/m³, the resistivity to airflow is constant, and equal to the constant current value. A computation of resistivity from fiber density and diameter will be presented for a model of glass wool that consists of parallel randomly placed fibers with equal diameters. The computation is based on Voronoi polygons, and the results will be compared with results from a self-consistent technique.