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# Measurement of acoustic and mechanical parameters of poroelastic materials by mean of active control and wave-based methods

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Poroelastic materials are used in sound barriers for sound insulation and absorption. At low frequencies, the medium is modelled using the Biot theory. This homogenised model needs to be feed by at least 8 parameters using the Johnson-Allard approach. The presented characterisation method relies on two specific test facilities. First, acoustic parameters are obtained thanks to a modified Kundt tube. The porosity and resistivity are obtained by direct measurements of the surface impedance with hard wall and zero pressure boundary conditions on the rear face of the sample, respectively. This last boundary conditions is achieved thanks to active control procedure. Finally, the remaining acoustic parameters are obtained in a least mean square sense. Mechanical parameters are then measured on a second test bench. A beam made of the poroelastic sample is subjected to mechanical broadband forcing. The transverse displacement is measured along the beam thanks to a laser vibrometre. Dispersion curves are then obtained by calculating the Inhomogeneous Wave Correlation (IWC) ratio. The Young modulus and loss factor of the sample are estimated thanks to an optimisation procedure applied to the finite element model of the test. Results are compared to those obtained using more classical quasi-static methods.