

ACOUSTICS2008/728

Calibration of apparatus for wave separation in wind instruments

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Knowledge of the forward and backward travelling waves inside the bore of a wind instrument is a useful starting point for the estimation of its playing parameters. These are mainly parameters describing the mouthpiece embouchure and the states of the toneholes. Due to the highly nonlinear behaviour of the excitation mechanism, a precise estimation is needed. The separation method under investigation relies on a model inversion, starting from the pressure measured by three microphones. For this reason the estimation is very sensitive to the relative positions of the microphones, and the latter must therefore be known very precisely. A geometrical measurement would not be reliable because of construction tolerances, including uncertainties about the acoustic centers of the microphones; therefore the distances are gathered through audio measurements. A number of approaches to such a calibration of the measurement system have been investigated, using a purposely constructed apparatus which will also be described.