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Extracting Reed Control Parameters Using Acoustic Measurements and Inverse Filtering

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The control of virtual musical instruments often relies on either a specially-developed controller on which the performer has usually not gained sufficient virtuosity to play musically, or an existing multipurpose general controller with control parameters not always easily, or intuitively, mapped to the synthesis parameters of the virtual instrument being performed. A response to this problem is to obtain control information from a musical performance where the performer uses an instrument with which s/he is sufficiently familiar.
In this work, we incorporate a previously developed measurement technique to transform a measured clarinet signal into a sequence of pulses corresponding to the reed displacement as a function of time. The measurement technique, shown to obtain accurate reflection functions from various tube structures, is used to obtain a filter modeling the bore and bell of the wind instrument used in the performance. The "reed pulse" waveform is then isolated by inverse filtering the measured clarinet signal. The characteristics of this residual waveform, which evolve with the performer's control of the instrument, may be extracted and remapped to the synthesis parameters of a physical model.