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A setup for measurement of bowing parameters in bowed-string instrument performance

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An accurate measurement of instrumentalists' actions in playing situations is the basis for several research topics such as musical performance analysis, control of sound synthesis algorithms or effective validation of theoretical results in musical acoustics. We present a setup for a complete and accurate measurement of bowing parameters in bowed-string instrument performance, with minimum interference for the player. The method is based on the combined use of motion capture and sensors attached to the bow. An optical motion capture system was used to track the position and orientation (6 DOF) of the bow and the instrument. In addition, sensors were attached to the frog of the bow for measuring bow acceleration in different axes and bow force exerted on the strings. Both sensors can be easily attached to any bow. We will describe how the data from the different systems are combined for an accurate calculation of bowing parameters, such as bow-bridge distance, bow velocity, bow acceleration, bow angles and bow pressure. Finally, we will present examples of measurements and briefly discuss some potential applications.