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Experimental investigation for effects of jet angle on the harmonic structure in the flute

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Abstract

To clarify the effects of jet angle on the radiated sound from the flute, the radiated sound and jet fluctuations were experimentally investigated. An artificial blowing device with an artificial oral cavity was used to change the jet angle and the geometric jet offset (the relative height of the vertical line of the cavity exit center from the edge) independently. The actual jet offset (the relative height of the jet fluctuation center from the edge) was estimated based on the velocity profile measured by a hot-wire anemometer. Under the condition that the geometric jet offset is zero, the actual jet offset changed with the jet angle. Also, the sound of the second/third mode radiated more/less intensely with larger actual jet offset, while the radiated sound of the first mode remained almost the same level. These results indicate that the variation of the jet angle affects the actual jet offset, which affects the harmonic structure.

Keywords: Flute, Jet angle, Jet offset