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Flow Instabilities in Flute-like Instruments RODOLFO OSTILLA MONICO, AHMED JANJUA, University of Houston — Flute-like instruments have a common working mechanism that consists of blowing across one end of a resonating tube to produce a jet of air that is directed at a sharp edge producing sound. Analysis of operation of flutes involves numerous research fields including fluid dynamics, physics, and aero-acoustics. In this study, an effort has been made to investigate more about the flow of air in flutes using 2D Direct Numerical Simulation. An analysis of the response of the jet of air by varying the jet width, profile, offset, and Reynolds number, and the flute labium angle in a 2D domain is the main focus of this study. We find that oscillations are sustained in the Reynolds number range 1000-2000, with lower Reynolds numbers producing no oscillations, and large Reynolds numbers developing a chaotic flow. These ranges also slightly differ for different parameters. We quantify the oscillation period and find heavy dependence on all parameters. These results lay out a framework to continue investigating instabilities in flute-like instruments.

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