



Acoustic characteristics of the Stroh-violin

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In 1899, the engineer Augustus Stroh invented the Stroh-violin (A. Stroh, Improvements in Violins and other Stringed Instrument, patent No. 9418 , 4th May 1899). This instrument has a solid body instrument, in which the soundbox has been suppressed. The bridge is mounted in a rocking whose vibrations are transmitted to a circular diaphragm, put at the entrance of a horn. The acoustic behaviour of hybrid instrument has two characteristics : Firstly, the directivity is strong and directly linked to the properties of the horn. Secondly, the spectral analysis of sounds produced by the instrument shows a filtering effect induced by strong resonances of the coupled bridge-diaphragm-horn system. A detailed experimental study of these two characteristics is performed on a modern Stroh instrument. Complementary investigations are also provided on historical Stroh-violin and Stroh-cello. A physical model of the instrument is done : the horn acoustic input impedance of the horn and the bridge admittance are modelled using a lumped element model, permitting an interpretation of the instrument response. The resonant behavior of the bridge has similar features with the one encountered in some classical violins and known as Bridge Hill. A discussion on the importance of the resulting filtering effect is made.