ACOUSTICS2008/2729 More experimental evidence favouring the hypothesis of significant wall vibration influence on radiated horn sound

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The question whether wall vibrations of wind instruments do or can affect the radiated sound has not been finally answered yet. Instrument makers and musicians make a strong claim that wall thickness, material and conditioning are crucial factors for sound quality and response of wind instruments, while acousticians rather tend to question that claim. Recent experiments on horns are presented favoring the hypothesis that wall vibrations do matter. Although horn sound in general appears to change quite significantly when wall vibrations particularly those of the bell are dampened during artificial playing, it becomes more and more evident that more than one single mechanism has to be considered to explain the whole phenomenon. Radiation of the bell as multi-pole will add directivity and strengthen higher harmonics while absorption by the wall will rather weaken them. Dynamic interaction between air column and oscillating bore profile theoretically depends on broken symmetry. Feedback of structural resonances to the oscillating lips can be avoided by decoupling the mouthpiece from the instrument. Experiments and statistical evaluation have been laid out in order to exclude or identify certain mechanisms as well as possible artifacts like changes of mouthpiece position, bore or acoustical environment caused by damping forces.