



Numerical analysis and comparison of brass instruments by continuation ^{*†}

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Abstract

Brass instrument design has long been relying on empirical know-how, build up over the years by the craftsmen. Some relationships between the air-column geometry, the intonation and some attributes of sound color have been formalized through this process by the makers. However, many properties of the instrument, related to timbre, dynamic range, playability, etc. are still very difficult to correlate to the design. Alongside these issues and important questions for the craftsmen, the knowledge in the acoustics of musical instruments has extensively improved in the last decades, benefiting especially from cutting edge engineering methods for the analysis of dynamic systems. In this presentation, we will detail some applications of stability analysis and continuation (Asymptotic Numerical Method), to physical models of trumpets. This approach aims to clarify differences between instruments on the basis of calculated performance descriptors. On a longer term, our goal is to include these technologies in the development of new instruments, by providing some virtual performance analyzers for the design of brass instruments.

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