Acoustics of Indian Musical Instruments: Historical and Scientific Perspectives

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Abstract

A historical and scientific study of Indian musical instruments offers several novel avenues of research in ethnomusicology, vibrations, and acoustics. In this presentation, we will talk about certain Indian instruments from the context of highlighting their unique design features, simultaneously discussing their archeology, and the challenges in the modelling of these instruments. The nature of the talk would be interactive supported by rich multimedia including sound samples. As the occasion demands, we will also draw connections with a few Japanese musical instruments. A variety of plucked stringed instruments (which include *tanpura*, *sitar*, *surbahar*, *rudravina*) maintain their unique identity due to a curved bridge, round (gourd) resonator, *juari* (cotton thread running orthogonal to the string on the bridge), sympathetic strings, and a rounded fingerboard. We will emphasize the acoustical importance of these features, while also presenting their historical development. We will also present some recent experimental and modelling work in this direction. Indian membranophones (drums) are unique in the world for their musicality and richness of sound. Drums are otherwise mostly associated as time keeping and beat instruments. In this context, we will discuss two classes of Indian drums. One for which rich harmonic overtones are generated by making the membrane inhomogeneous (*tabla*, *pakhawaj*, *mradangam*), and other where there is a skillful variation of tension and a coupling with strings (*idakka*, *damru*). The latter are closely related to the Japanese *tsuzumi*. Again, we will discuss some of our efforts towards experiments and modeling of Indian drums.