

# Physics of Edakka

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## Introduction

The construction, and sound producing mechanism is peculiar in Edakka in comparison with other pitched drums in India. The present Edakka may be developed from the drum Mandi Dakka with similar construction described in old Tamil literature Sangeeta Ratnakara [1]. An Edakka consists of a barrel of length about 9 inches made with Jackwood and the drum is played with a stick [2, 3]. The drum consists of two thin wires placed across the drum head covered with the thin skin of a cow.

There is no loading to stretch the membrane on the drum head. The instrument player moves the body made with jack wood upward and downward with left hand to stretch the circular membrane that produces the pitched sound.



**Figure 1:** A typical Edakka played in temples of Kerala

In ordinary drums, the frequencies generated by striking the drum head are not integer multiple of the lowest frequency and hence their sound has no musical character. In other words, they do not produce pitched tones. Like other drums, Edakka consists of a single circular membrane. But, the variations in tension, its particular design etc contributes to the generation of harmonics.



**Figure 2:** a wooden barrel of Edakka

As the tension on the drum head can be varied to a large extent, a wide range tones are produced on the drum [4]. The presence of many higher harmonics produces the richness for the tones produced by the instrument. The air inside the wooden cavity of the drum is pushed inward and outward during the vibration of the membrane through small hole at the central region of the wooden body. The wooden pegs on the drum are used to fine tune the sound produced by Edakka [5]. The soft sound generated by the drum conveys the sense of joy and hap-

## Materials and Methods

Visual analyzer, a free software available in the internet is used to study the harmonics. The software is opened from the start menu as

*start* → *Visual analyzer*

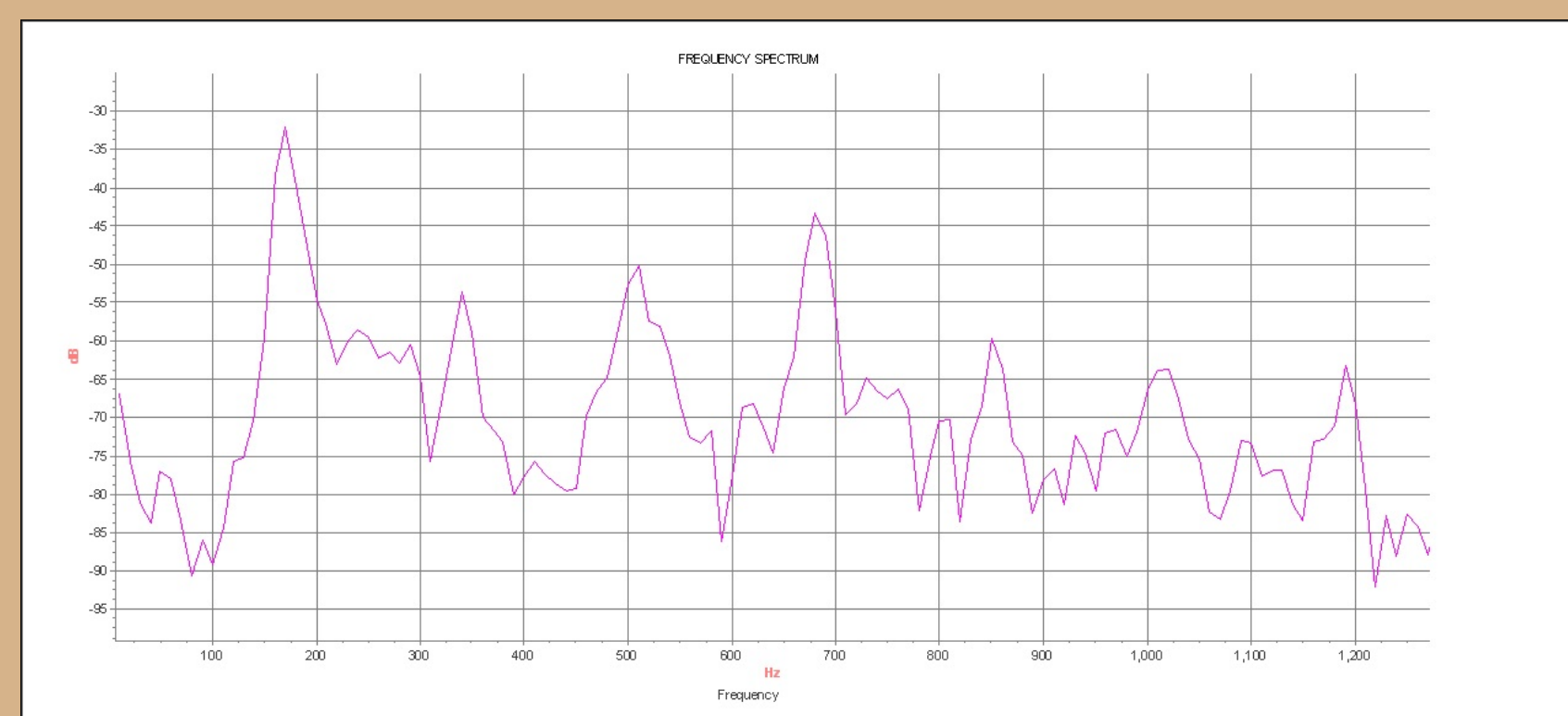
An ear phone is plugged-in to the audio port of the laptop. The sound sample of Mridangam in a mobile phone is played. To view the real-time wave, the "On" button in the menu bar is clicked.

In the left bottom box "capture spectrum" is clicked to view the frequency spectrum of the sample. A new window with spectrum appears. Place the cursor on each peak in the spectrum the corresponding frequency is shown in the bottom of the figure. In the left bottom box "capture spectrum" is clicked to view the frequency spectrum of the sample. A new window with spectrum appeared. Place the cursor on each peak in the spectrum the corresponding frequency is shown in the bottom of the figure. The image is saved as

*File* → *Save spectrum as text*

## Results and Discussion

The drum Edakka is capable to generate tones with perfect harmonics. A trained artist can generate music on the drum. In Kerala, famous Edakka artists play popular film and folk songs on Edakka. Many years of practice and rigorous training is needed to assimilate the correct positions on the drum head to produce swaras in the musical scale. The frequency spectrum of a particular stroke on Edakka is given in Figure 3.



**Figure 3:** Observed peaks in Edakka sound sample

The frequencies present in the spectrum are shown in Table 1.

Peaks	Frequency	Ratio
1	170.02	1.00
2	340.075	2.00
3	510.131	3.00
4	680.186	4.00
5	850.241	5.00

**Table 1:** Observed Peaks of Edakka

## Results and Discussion

In ordinary drums there are degenerate modes of vibration. When tension is applied on the drum head, these degenerate modes vibrate at the higher frequencies. The careful shifting of the tension maintains the modes to vibrate at the frequencies that are integer multiple of the fundamental. From Figure 3, it is clear that the most excited mode with prominent peak is the fundamental. The second and third peaks have moderate height. The second highest peak is observed at fourth position.

## Conclusion

Edakka stroke, its prominent modes excited during vibration are studied. The frequency spectrum of the sound sample is analysed using a free software Visual Analyser. The drum Edakka produces perfect harmonics and hence it is a good musical drum. The drum can be considered as a unique Indian contribution to musical instruments

## Aknowledgement

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## References

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