Mechanical Vibrations

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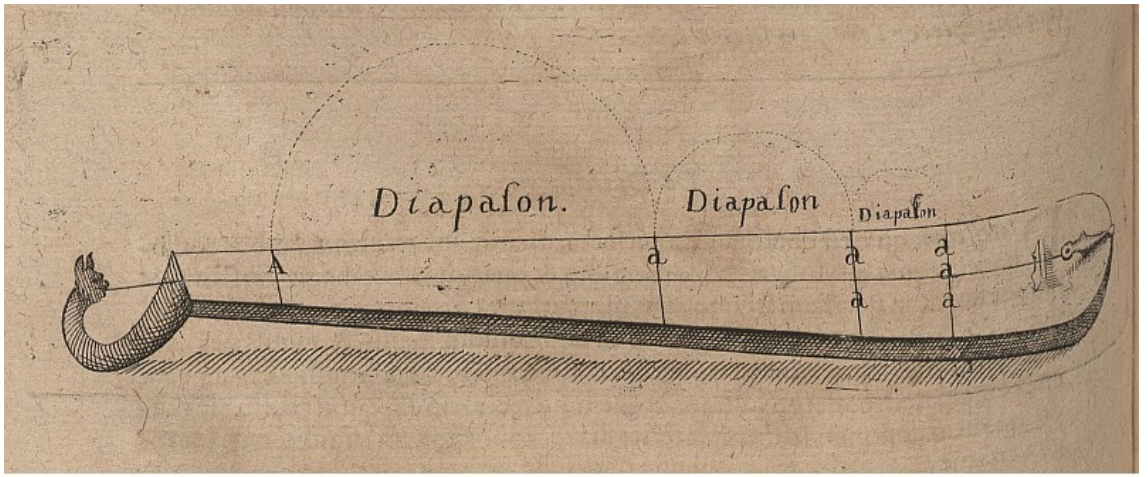
History of the Study of Vibrations

Pythagoras (582 – 507 AC)

Monochord



Quelle: Deutsche Fotothek

History of the Study of Vibrations

Aristotle (~ 350 AC) – Observations:

"*the voice is sweeter than the sound of instruments*"

"*the sound of the flute is sweeter than that of the lyre*"

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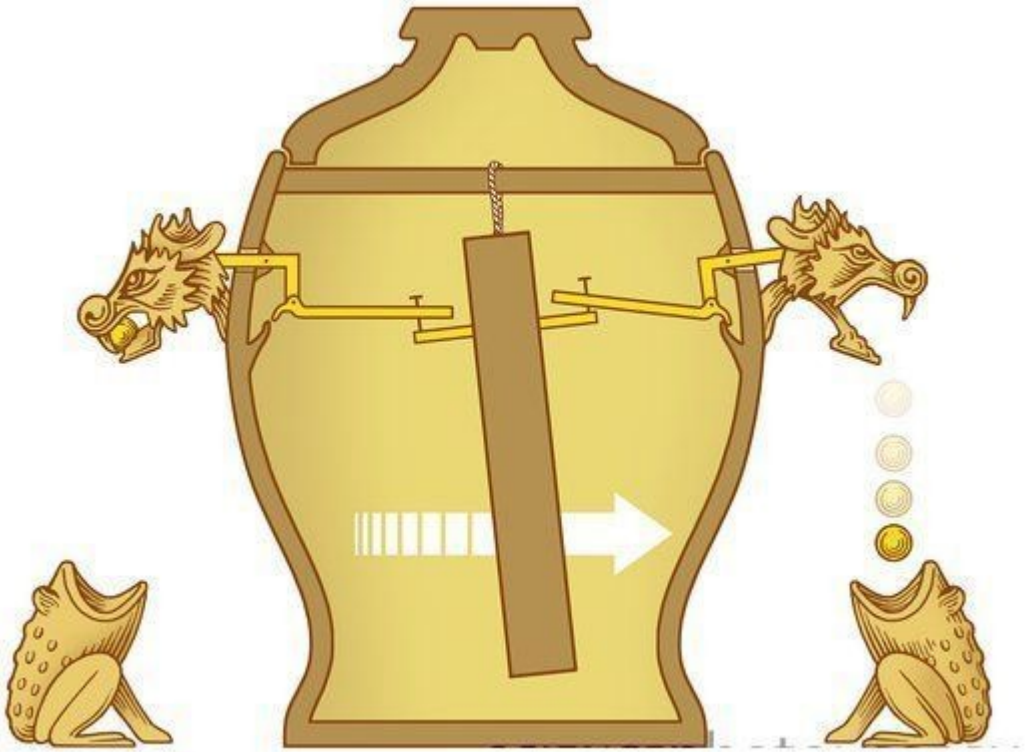
Zhang Heng (132 DC)

World's first seismograph



History of the Study of Vibrations

Galileo Galilei (1564 - 1642)

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Marin Mersenne (1588 - 1648)

HARMONIE
VNIVERSELLE,
CONTENANT LA THEORIE
ET LA PRATIQVE
DE LA MVSIQVE.

Où il eſt traité de la Nature des Sons, & des Mouuemens, des Conſonances, des Diſſonances, des Genres, des Modes, de la Compoſition, de la Voix, des Chants, & de toutes ſortes d'Inſtrumens Harmoniques.

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Robert Hooke (1635 - 1703)

Joseph Sauveur (1653 - 1716)

Experiments studying pitch and Frequency relationship

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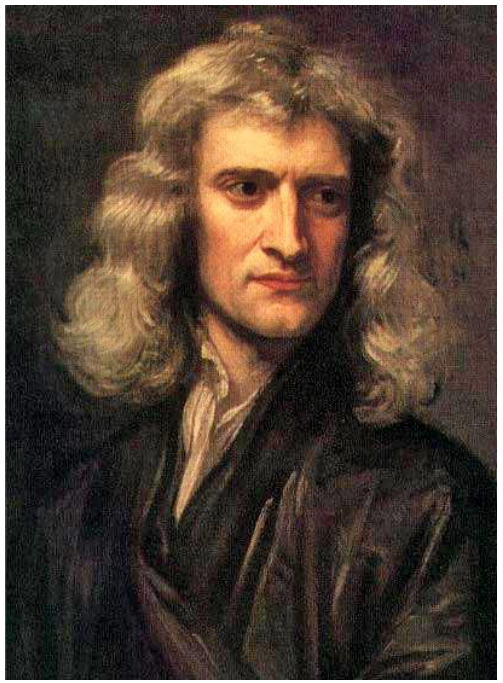
Isaac Newton (1642 - 1727)



Newton s second law of motion is routinely used in modern books on vibrations to derive the equations of motion of a vibrating body

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Brook Taylor (1685 - 1731)

Solved the theoretical solution of the problem of the vibrating string in 1713

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The procedure adopted by Taylor was perfected through the introduction of partial derivatives in the equations of motion by

Daniel Bernoulli (1700 - 1782)

Jean D Alembert (1717 - 1783)

Leonard Euler (1707 - 1783)

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The possibility of a string vibrating with several of its harmonics present at the same time (with displacement of any point at any instant being equal to the algebraic sum of displacements for each harmonic) was proved through the dynamic equations of Daniel Bernoulli.

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This characteristic was referred to as the principle of the coexistence of small oscillations, which, in present-day terminology, is the **principle of superposition**

This principle was proved to be most valuable in the development of the theory of vibrations and led to the possibility of expressing any arbitrary function (i.e., any initial shape of the string) using an **infinite series of sines and cosines**

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Because of this implication, D' Alembert and Euler doubted the validity of this principle. However, the validity of this type of expansion was proved by J. B. J. **Fourier** (1768 - 1830) in his Analytical Theory of Heat in 1822