

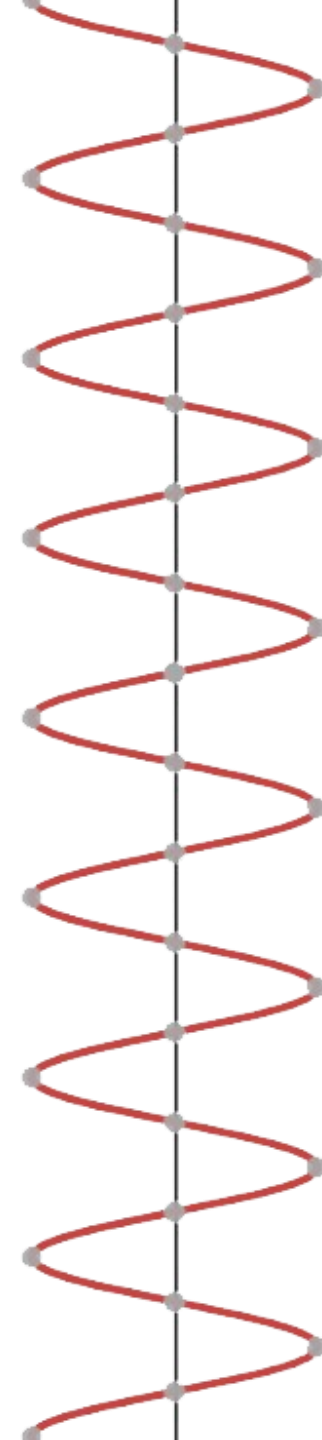
Ultrasonická levitace

Kronowetter Bořivoj

Pokorný Petr

Osnova

- Ultrazvuk a jeho využití
- Stojaté vlnění
- Levitace
- Měření rychlosti ultrazvuku



Ultrazvuk

- Fyzikální vlastnosti
- Vznik ultrazvuku (elektrostrikce)

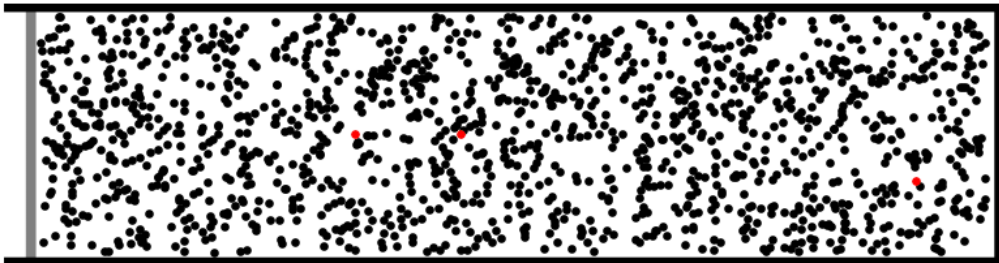


Využití ultrazvuku

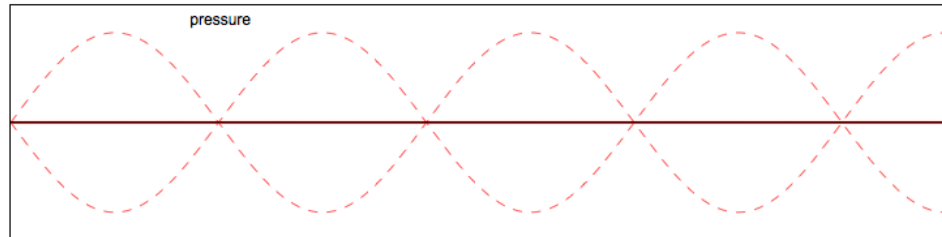
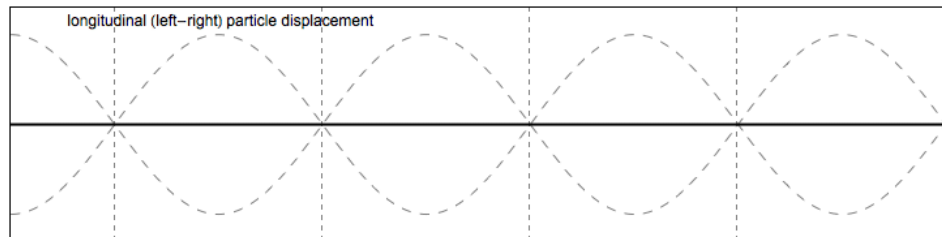
- Měření vzdálenosti
- Medicína (sonografie)
- Příroda (echolokace)
- Čištění ultrazvukem (kavitace)
- Defektoskopie
- Ultrasonická levitace



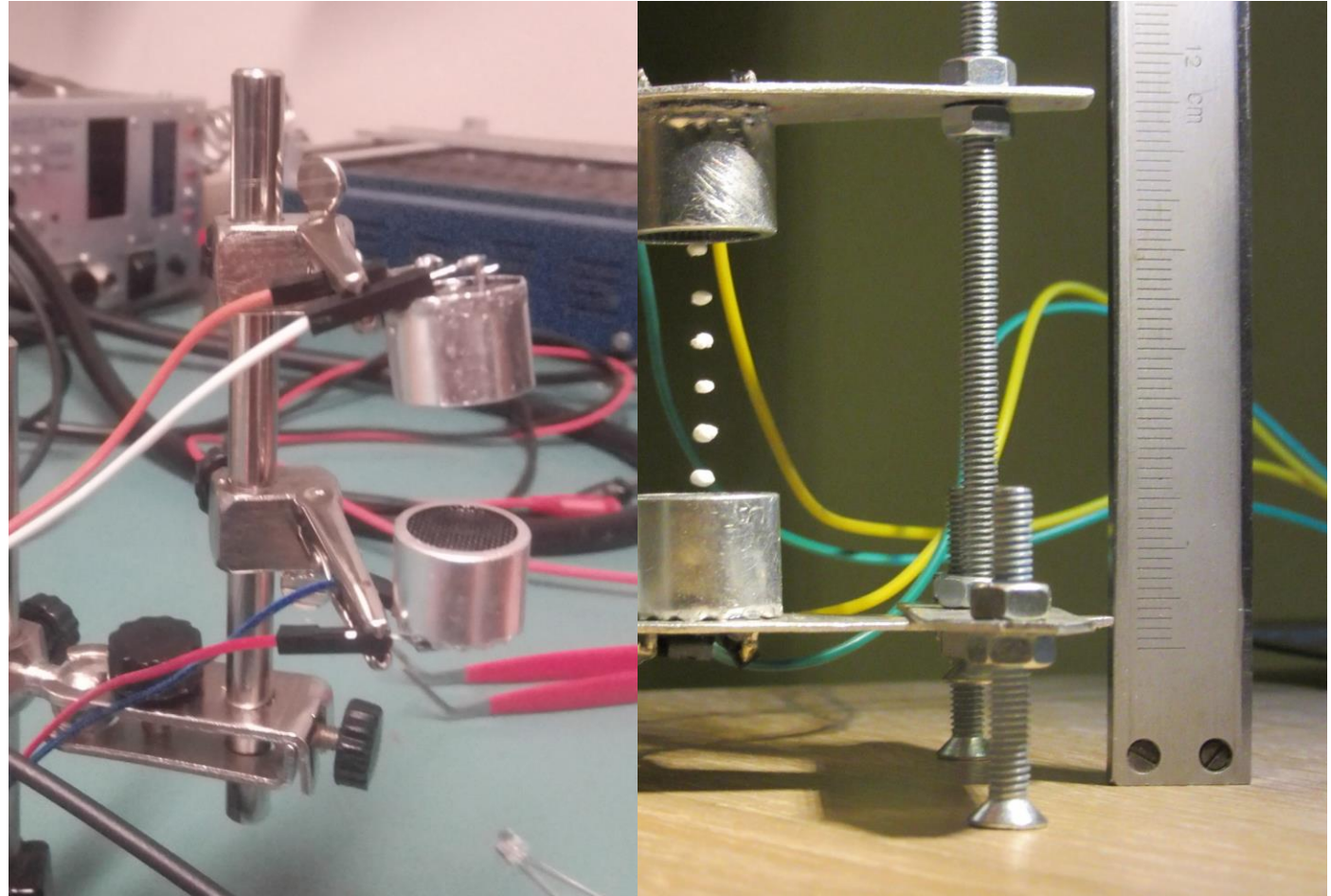
Stojaté vlnění

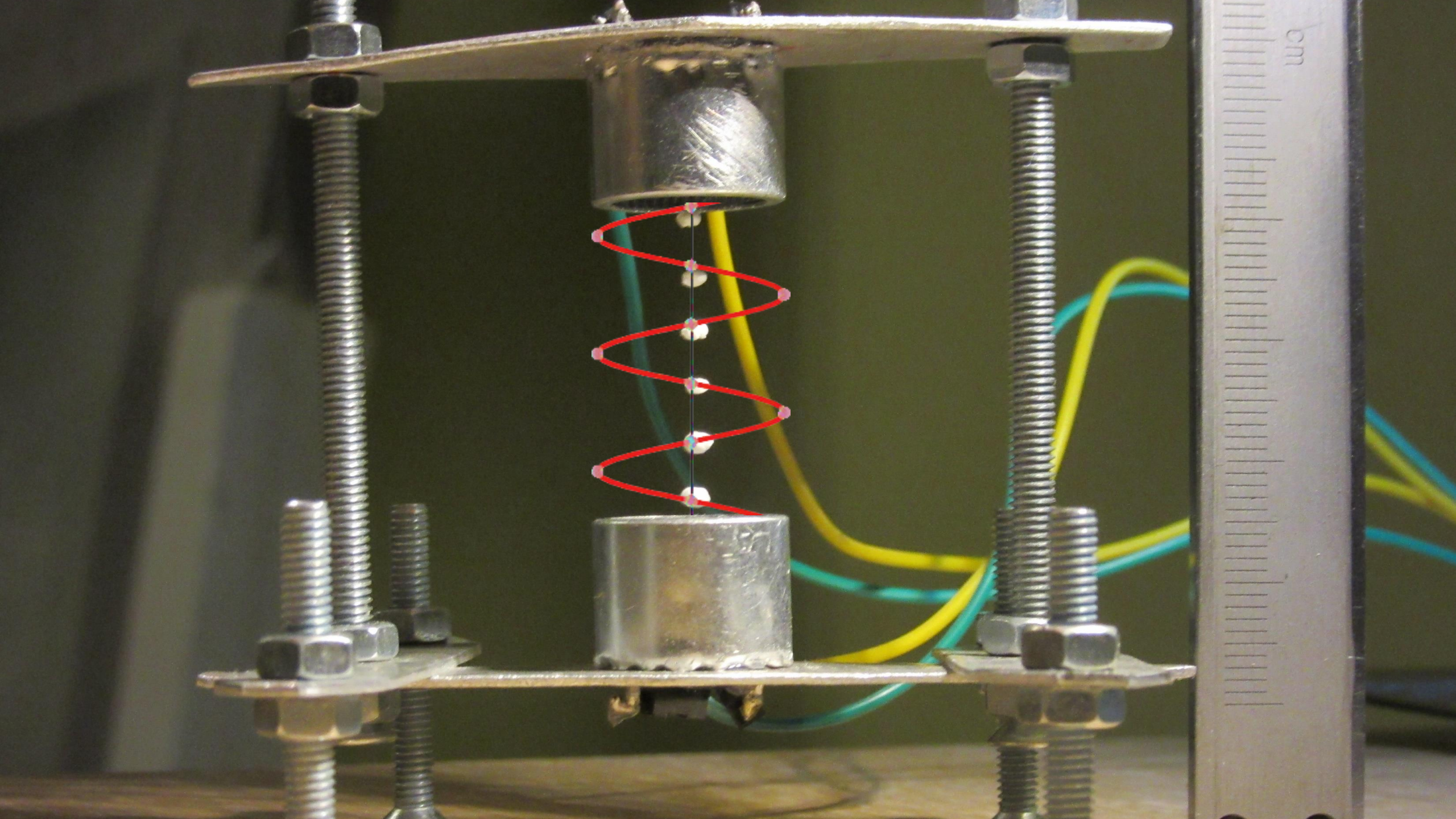


©2012, Dan Russell



Náš experiment





cm

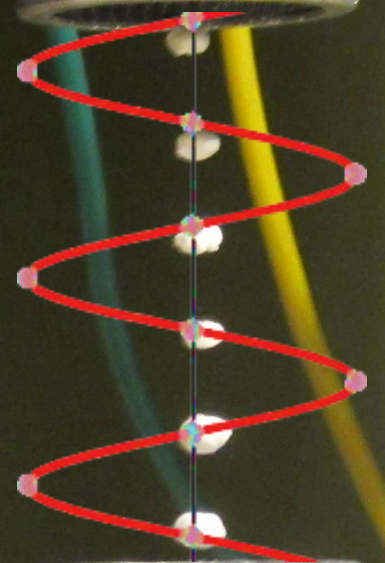
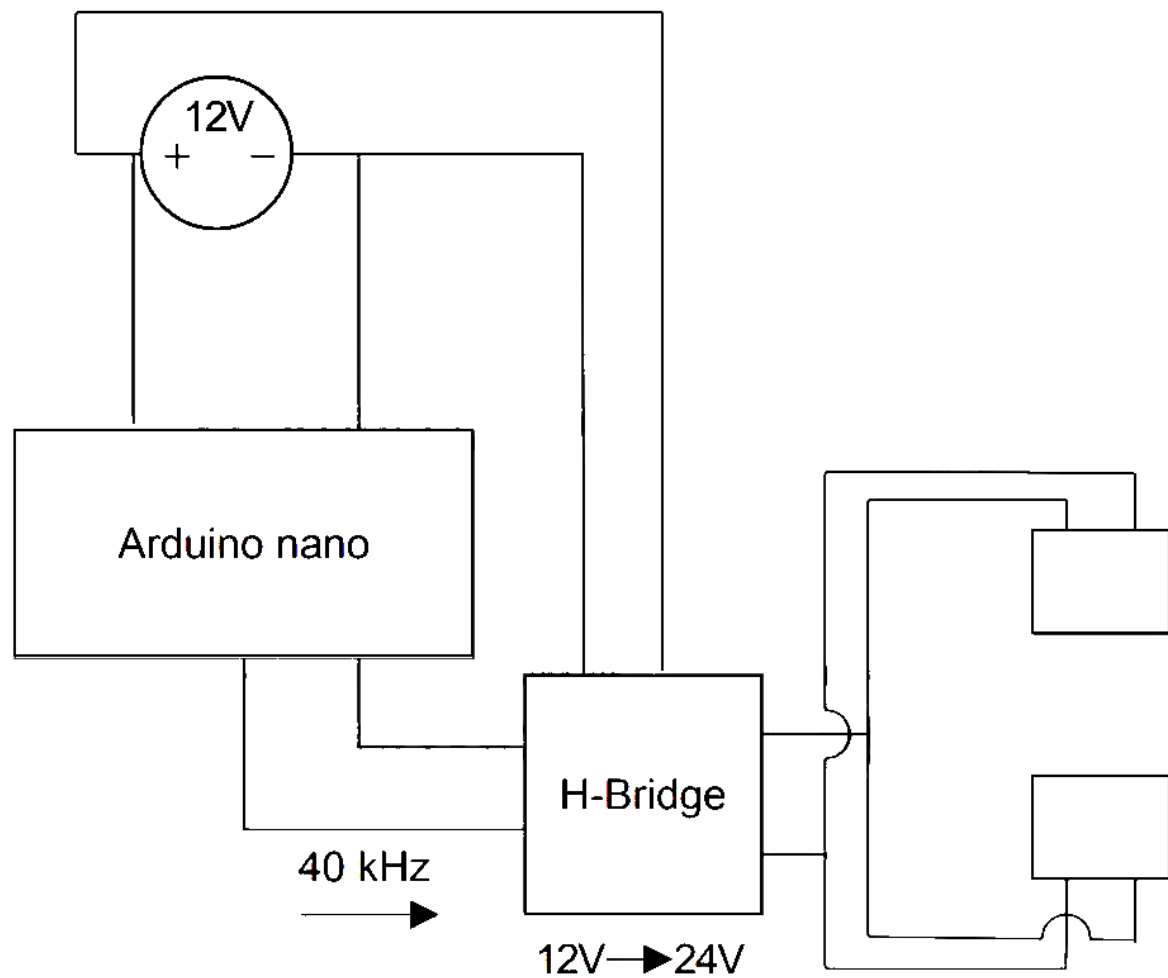
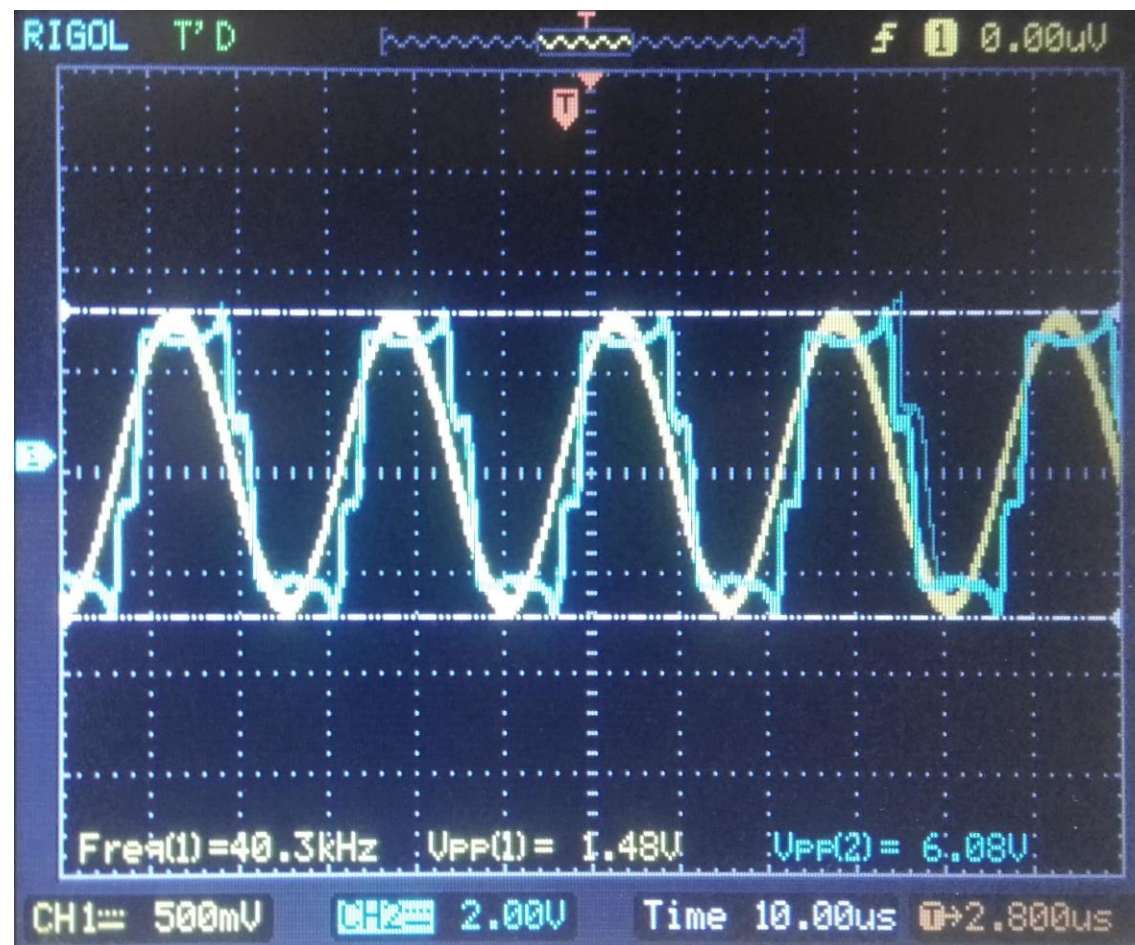
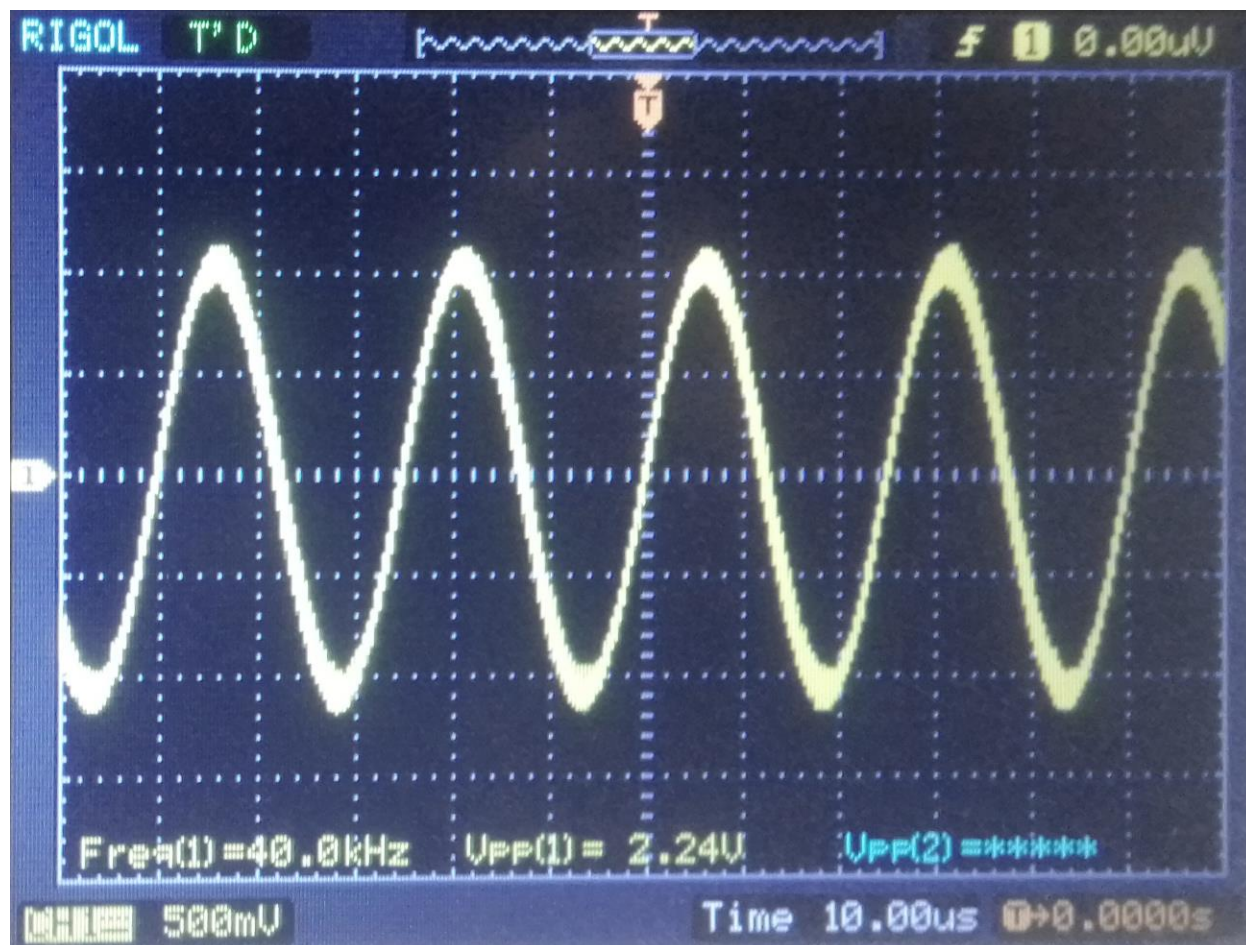


Schéma zapojení



Měření osciloskopem

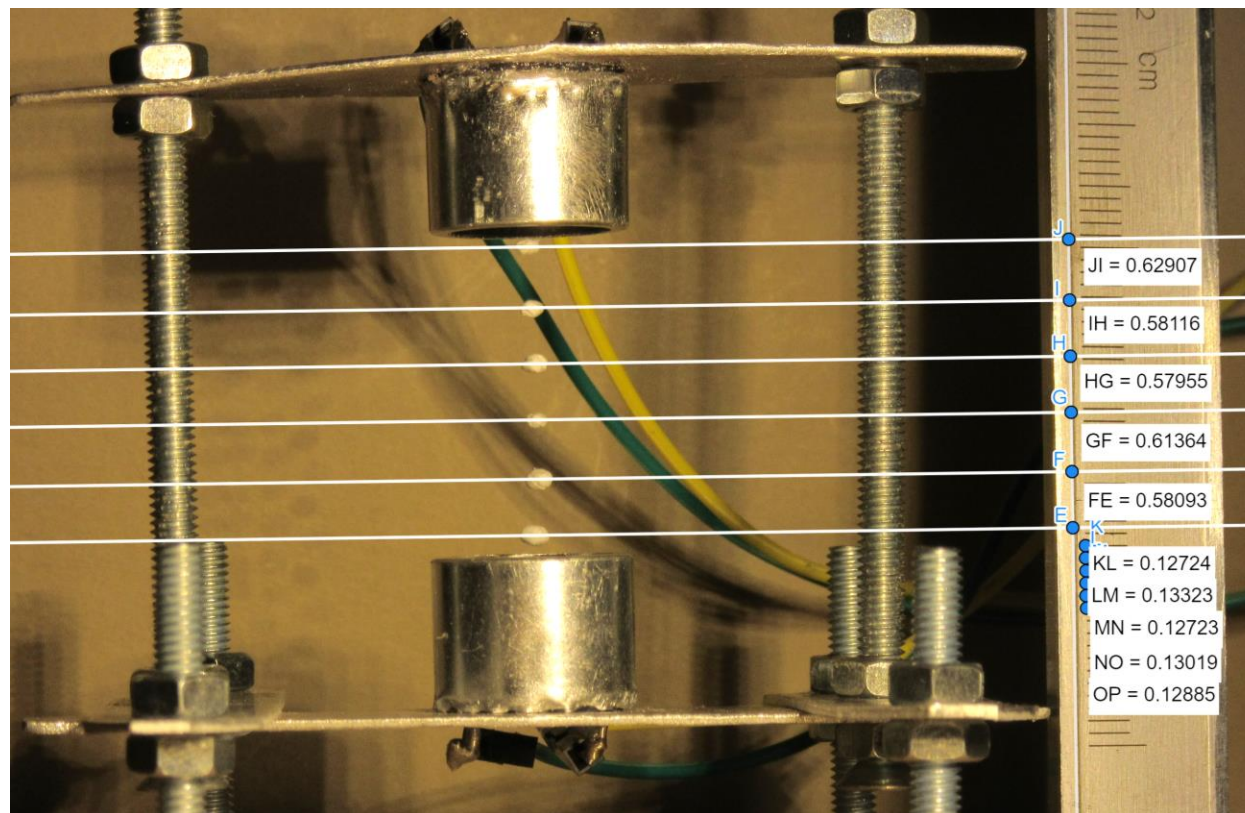


Výpočty

$$\lambda = \frac{v}{f}$$

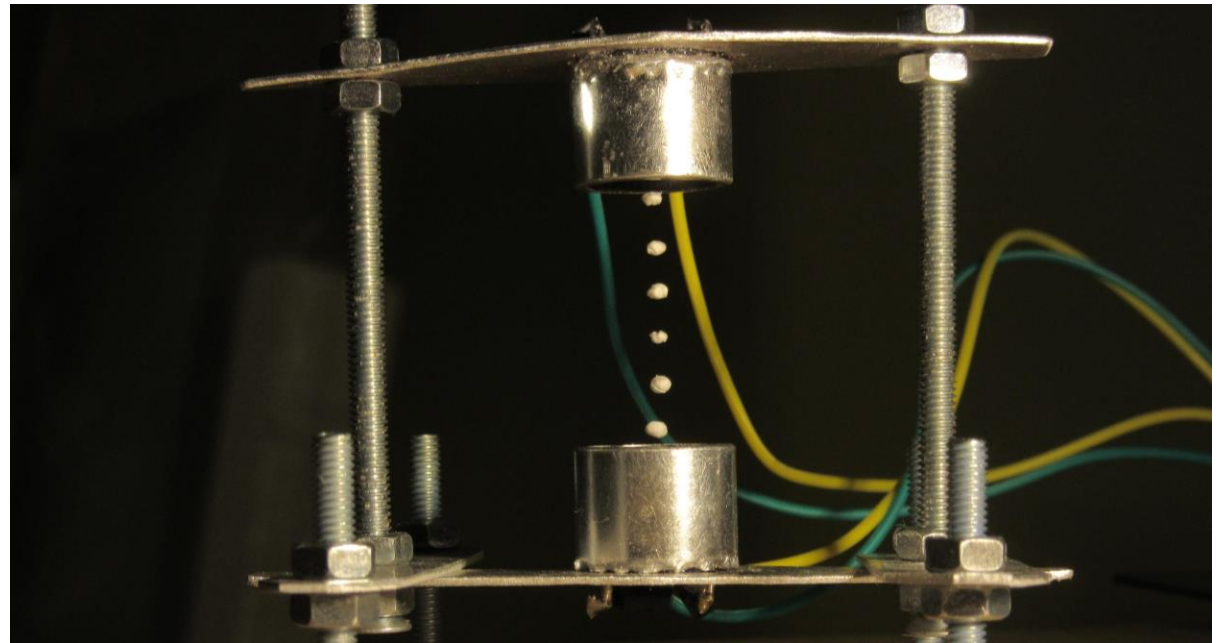
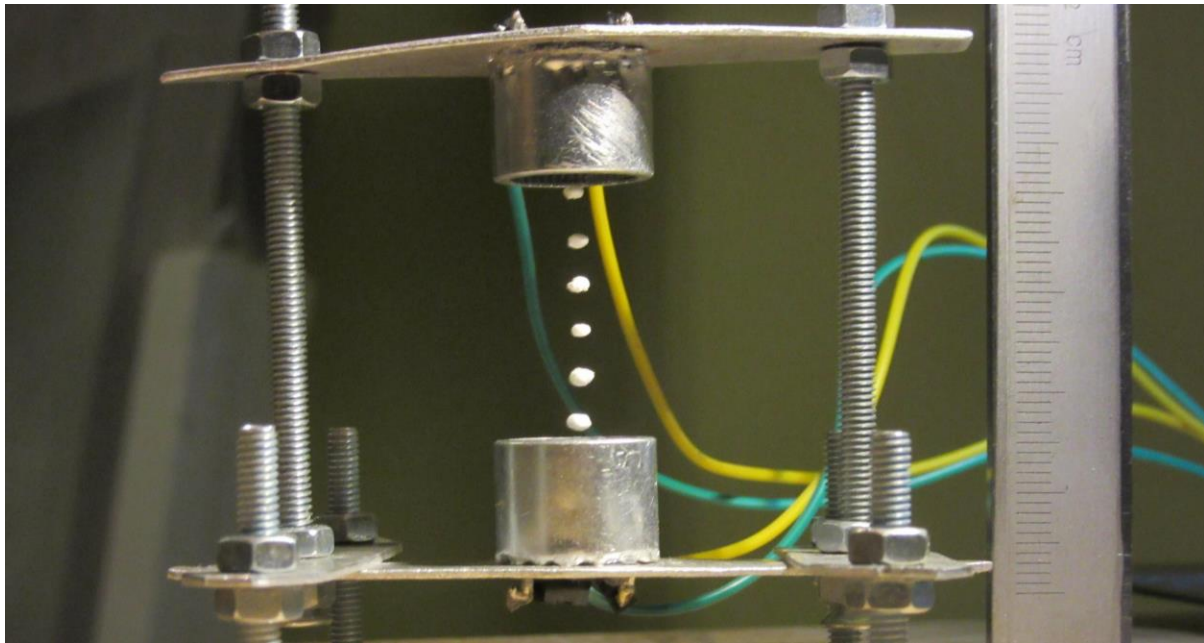
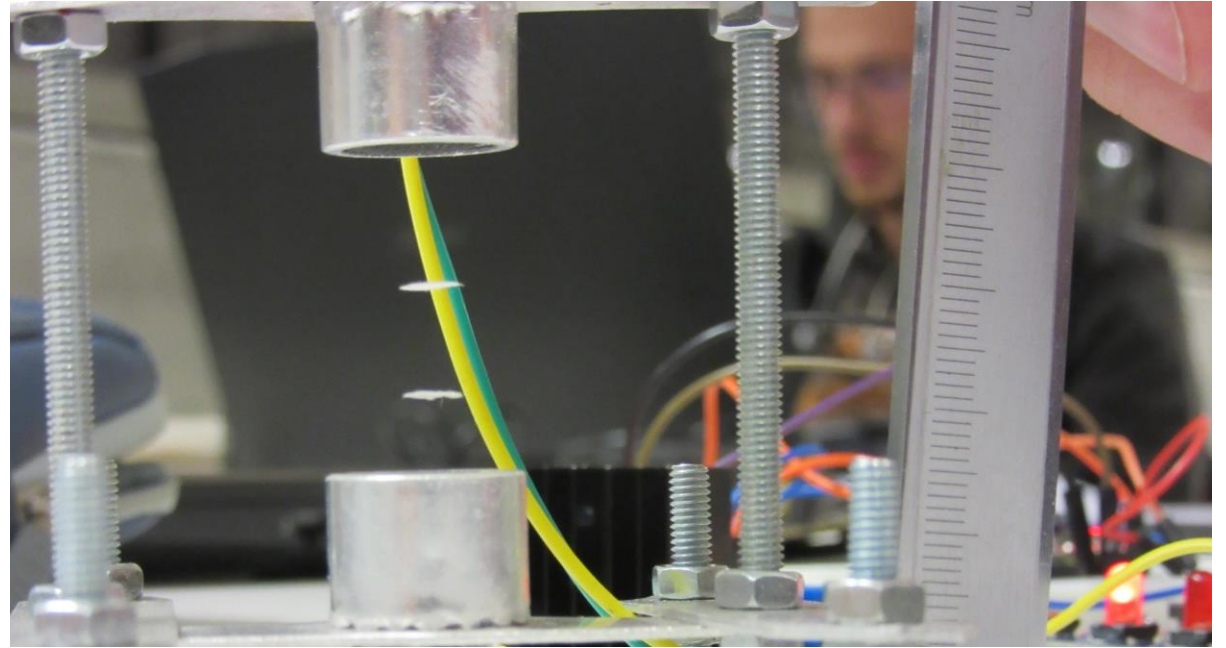
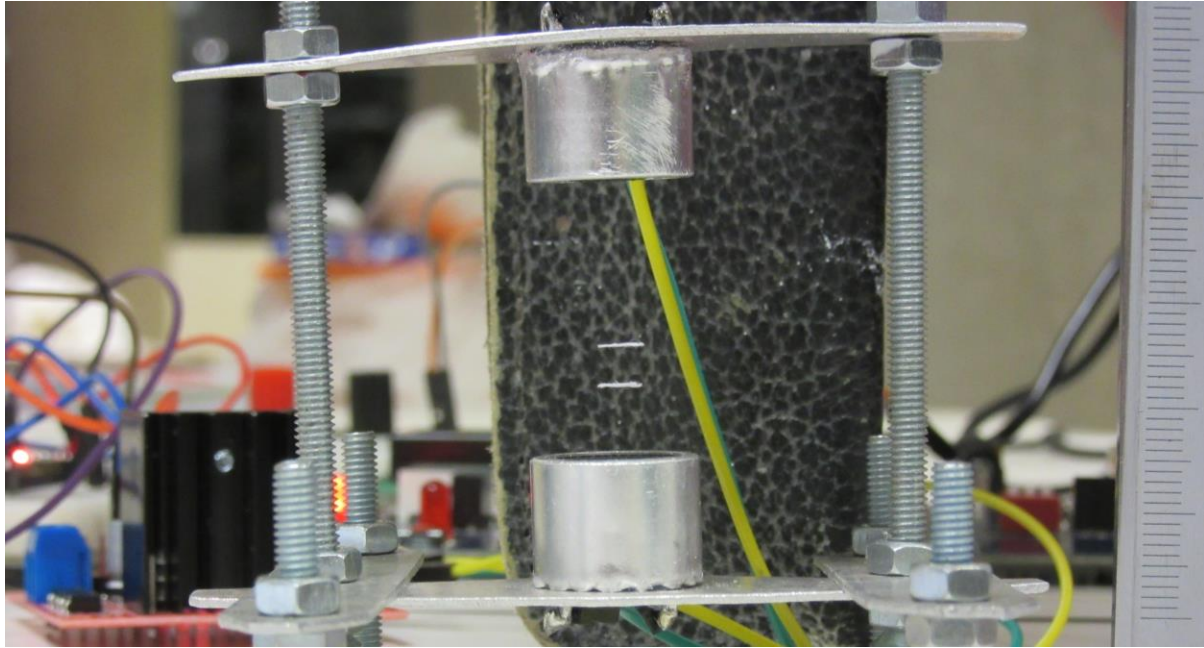
Hodnota č.	$\frac{\lambda}{2}$ [mm]	σ
1	4.863	1.4
2	4.493	0.7
3	4.481	0.8
4	4.744	0.7
5	4.491	0.7
Průměr	4.61 mm	
Chyba	0.08 mm	

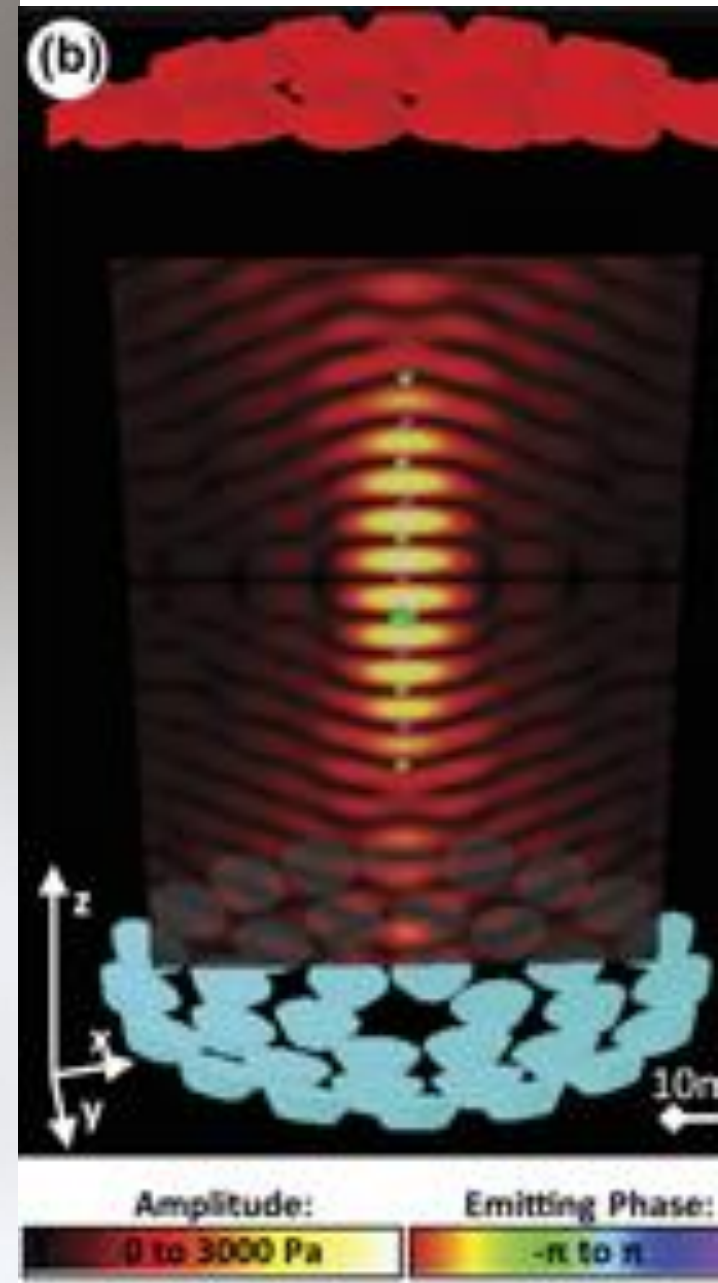
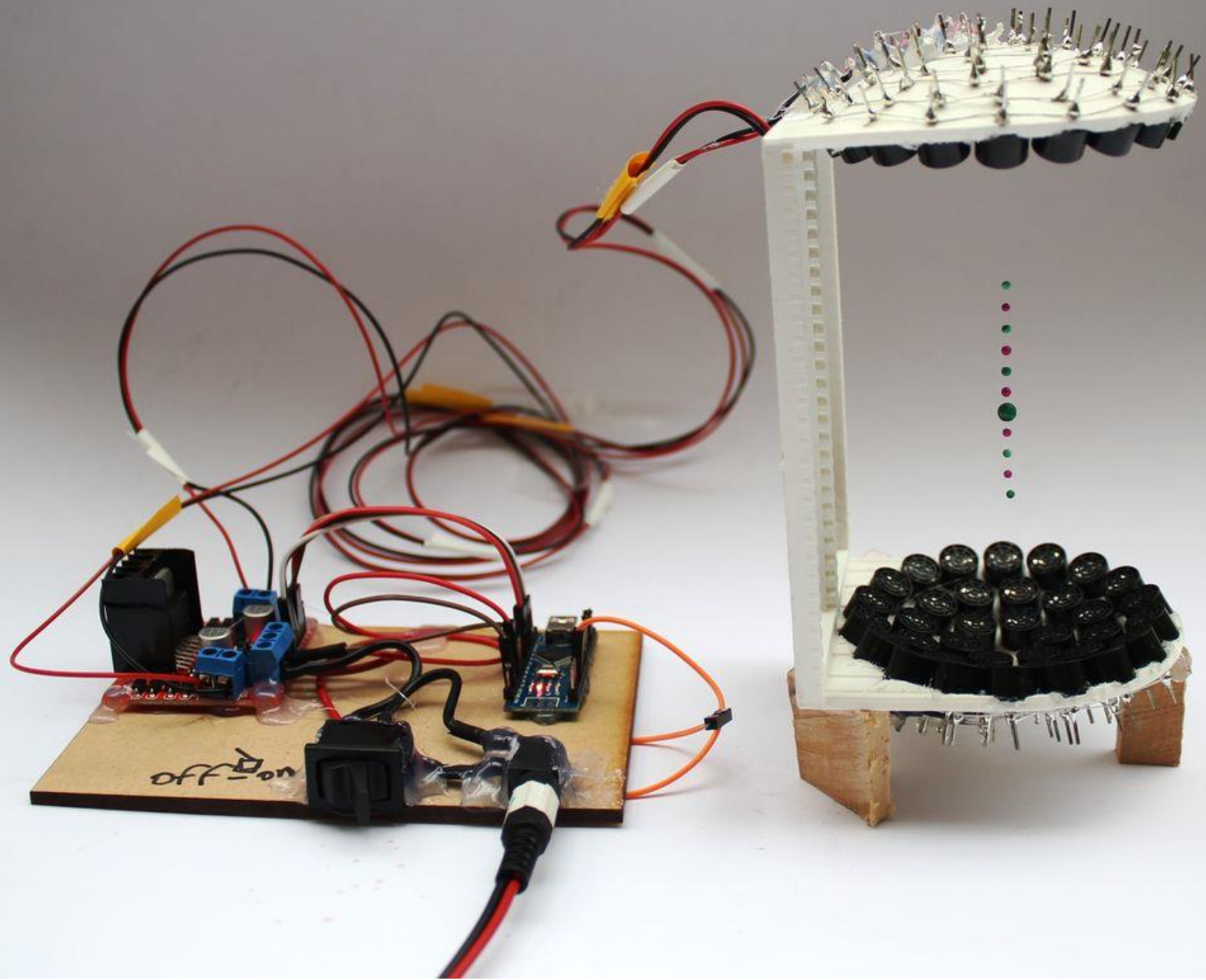
Tab. 1: Směrodatné odchylky, průměr, chyba

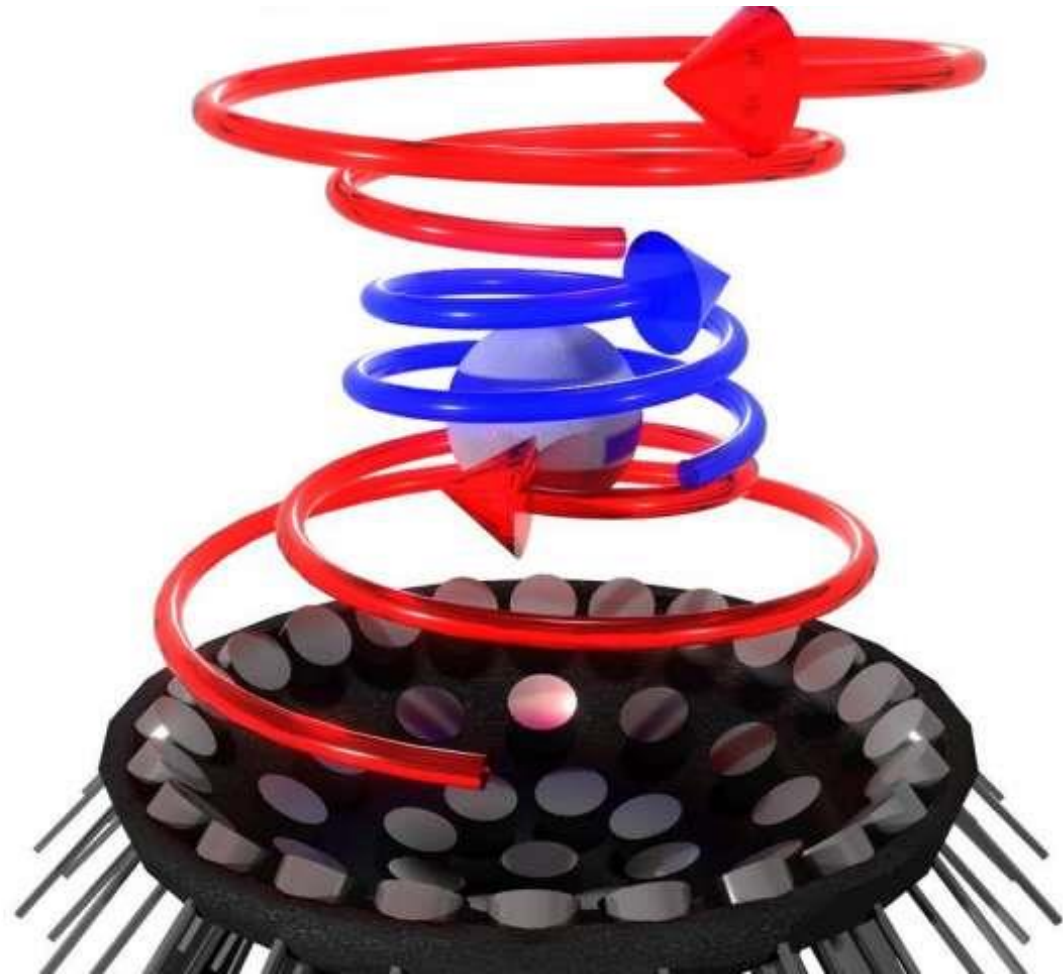


$$v = \lambda \cdot f$$

$$v = (368 \pm 6) \text{ m s}^{-1}$$









Děkujeme za pozornost

Zdroje

- [1] Adrian Barnes Bruce W. Drinkwater, Asier Marzo. TinyLev: A multi-emitter single-axis acoustic levitator. <https://aip.scitation.org/doi/full/10.1063/1.4989995>, 17 August 2017.
- [2] CLCStudent. Sound. <https://en.wikipedia.org/wiki/Sound>, 9 November 2019, at 14:27 (UTC).
- [3] InternetArchiveBot. Ultrazvuk. <https://cs.wikipedia.org/wiki/Ultrazvuk>, 16. 6. 2019 v 05:11.
- [4] Ulrich Schmerold. Micro Ultrasonic Levitator. <https://makezine.com/projects/micro-ultrasonic-levitator/>, September 6th, 2018, 6:00 am PST.
- [5] GYN ALW s.r.o. Ultrazvuk miminek. <https://www.gynekologie-orlova.cz/ultrazvuk-miminek>, rok neuveden.