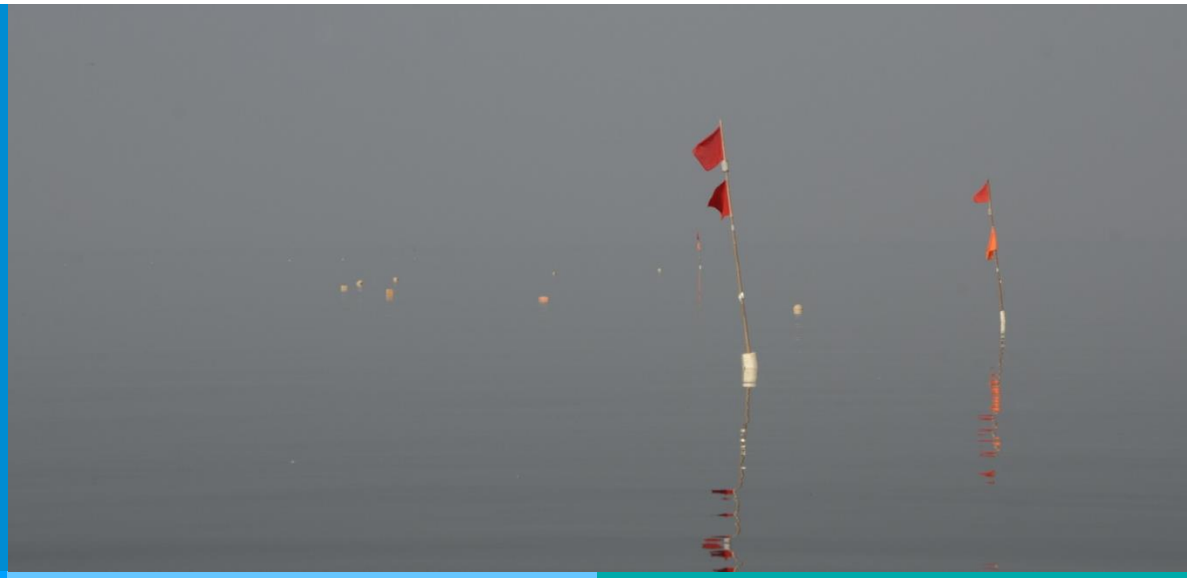
Gillnet modifications to reduce harbor porpoise bycatch

Isabella Kratzer, Daniel Stepputtis, Lotte Kindt-Larsen, Finn Larsen and many other colleagues



ASCOBANS,
June 2020

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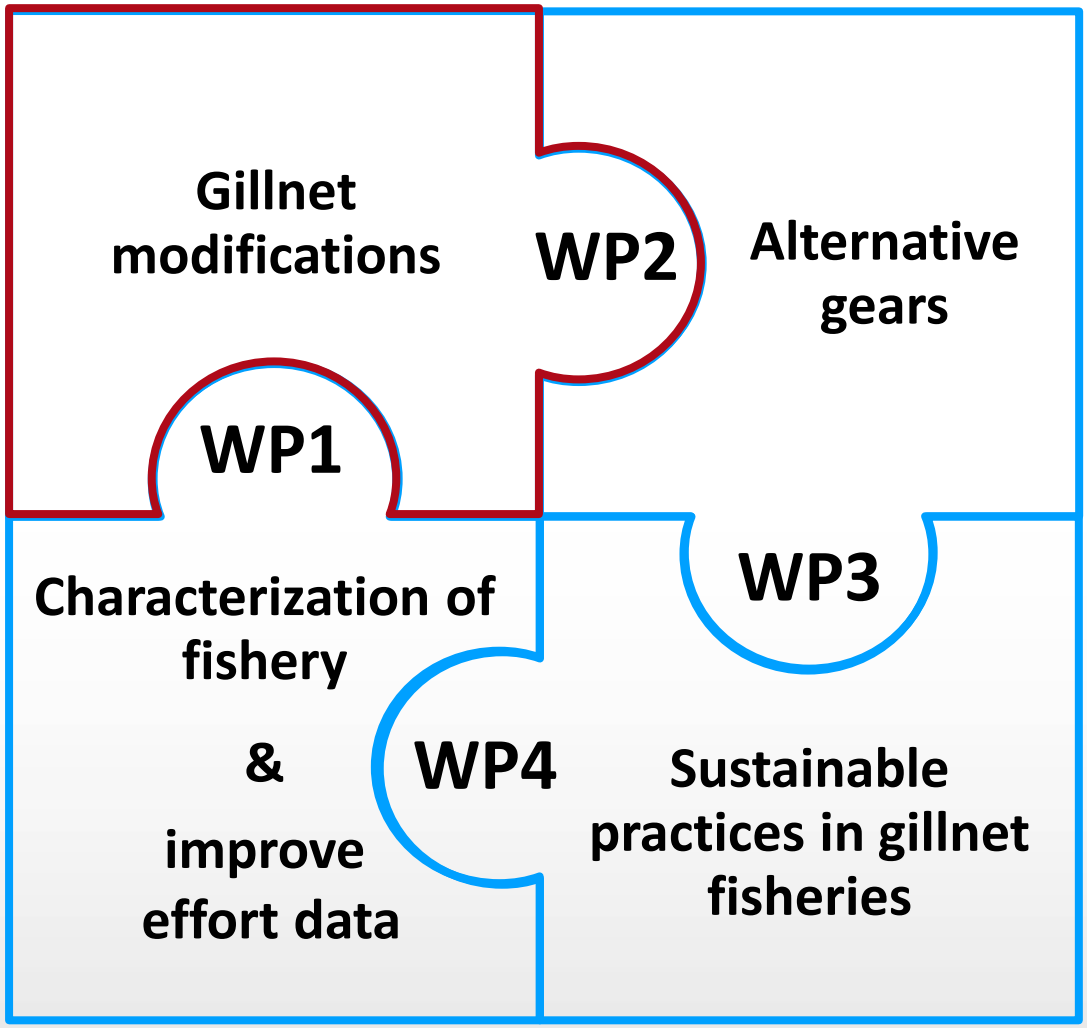
Holistic approach



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Gillnet modifications

Goal

A **Designguide**, that allows construction of **acoustically reflective**, **catch-efficient** gillnets

Method

1) Simulation study to identify ideal reflective object
2) Experimental verification of acoustic characteristics of reflector
3) Behavioral experiment to analyze porpoise behavior around nets
4) Trials in commercial fishery

Gillnet modifications

Goal

A **Designguide**, that allows construction of **acoustically reflective**, **catch-efficient** gillnets

Method

1) Simulation study to identify **ideal reflective object**
2) Experimental verification of acoustic characteristics of reflector
   - ➢ Same characteristics in all directions
   - ➢ Small (<1.5cm diameter)
   - ➢ Right combination of material properties and size

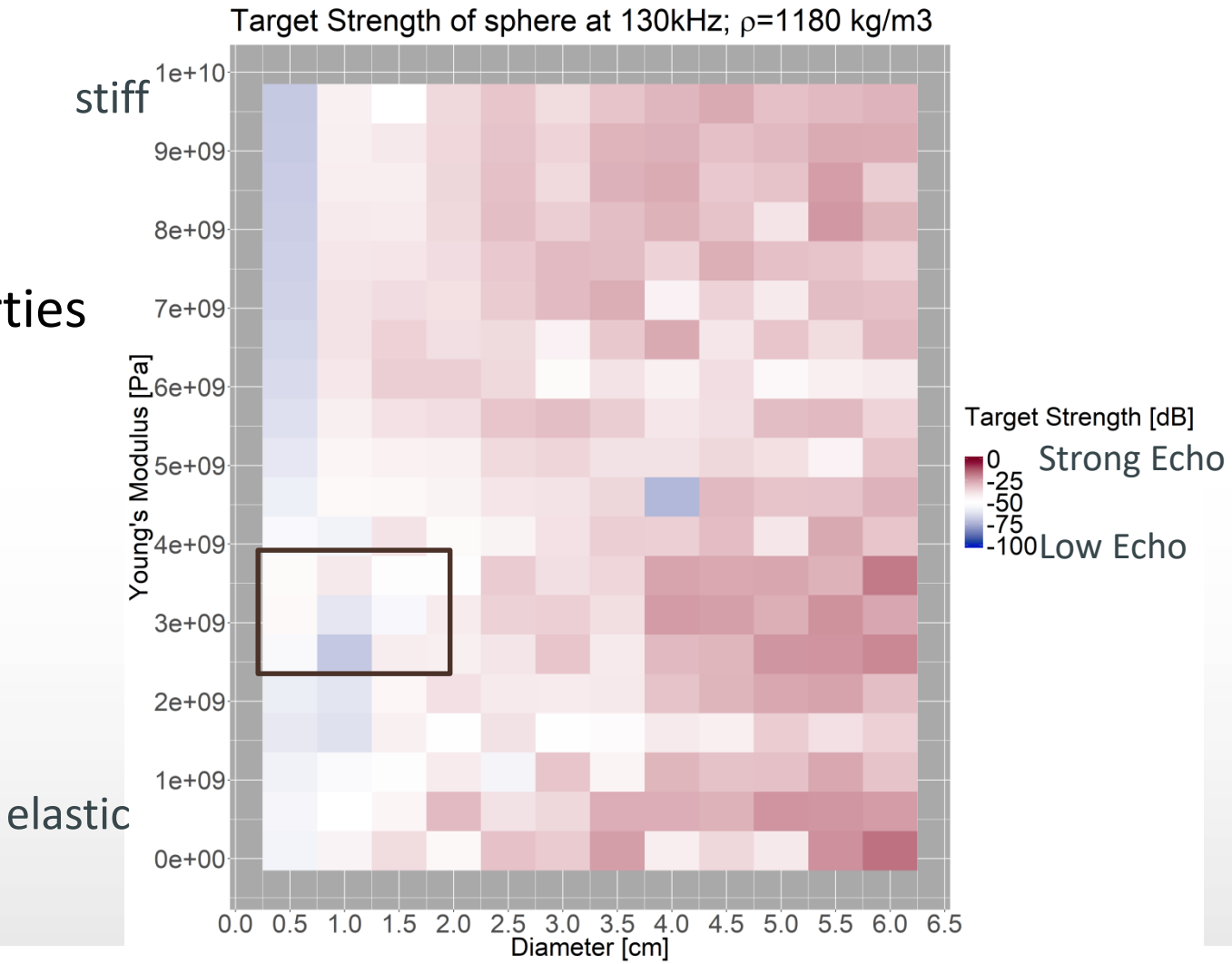
→ Search for **small sphere resonating** at **130kHz**

Simulation

Results

Target Strength

- material properties
- sizes
- frequencies



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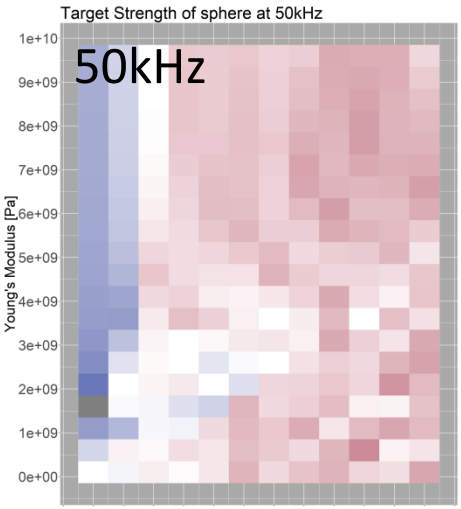
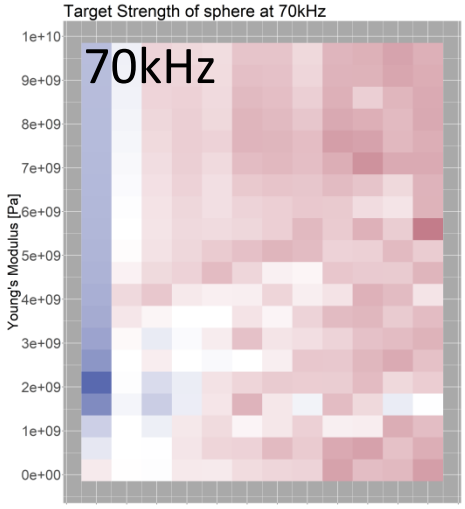
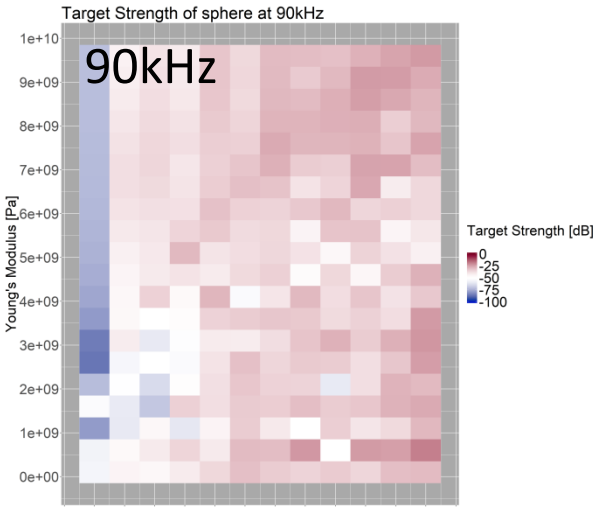
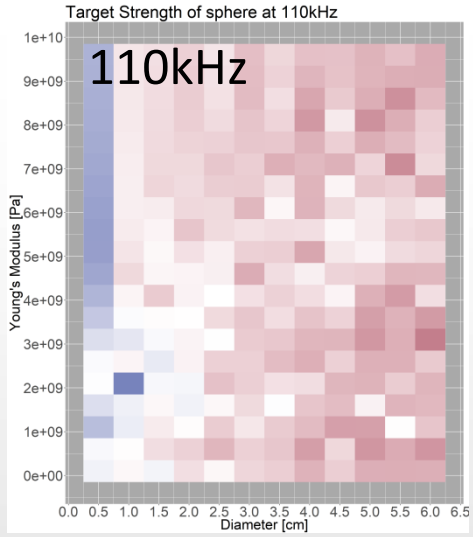
Simulation

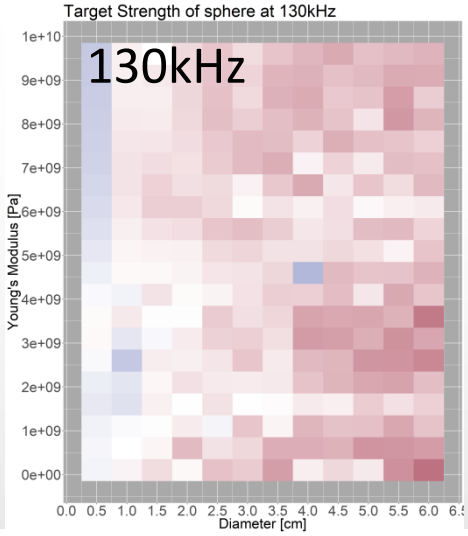
Results

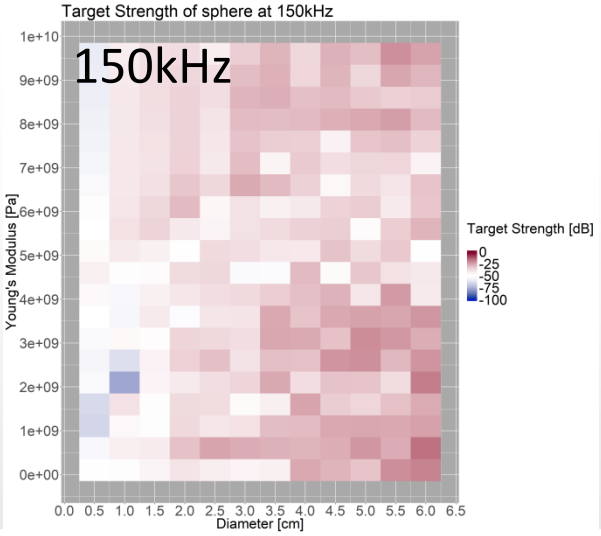












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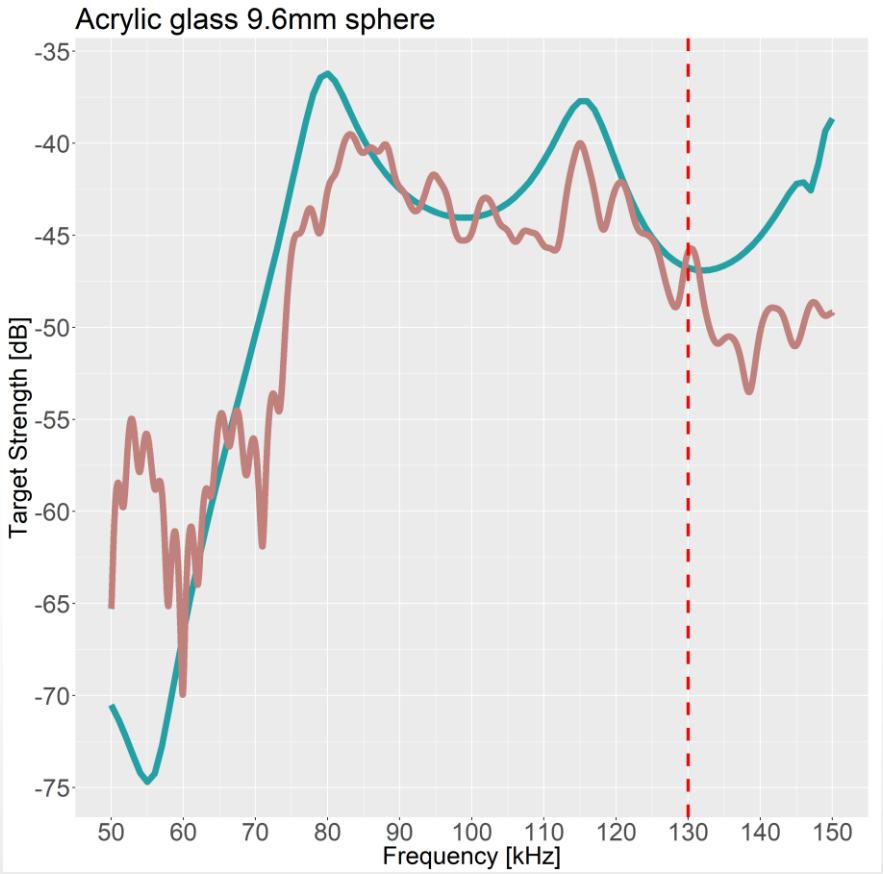
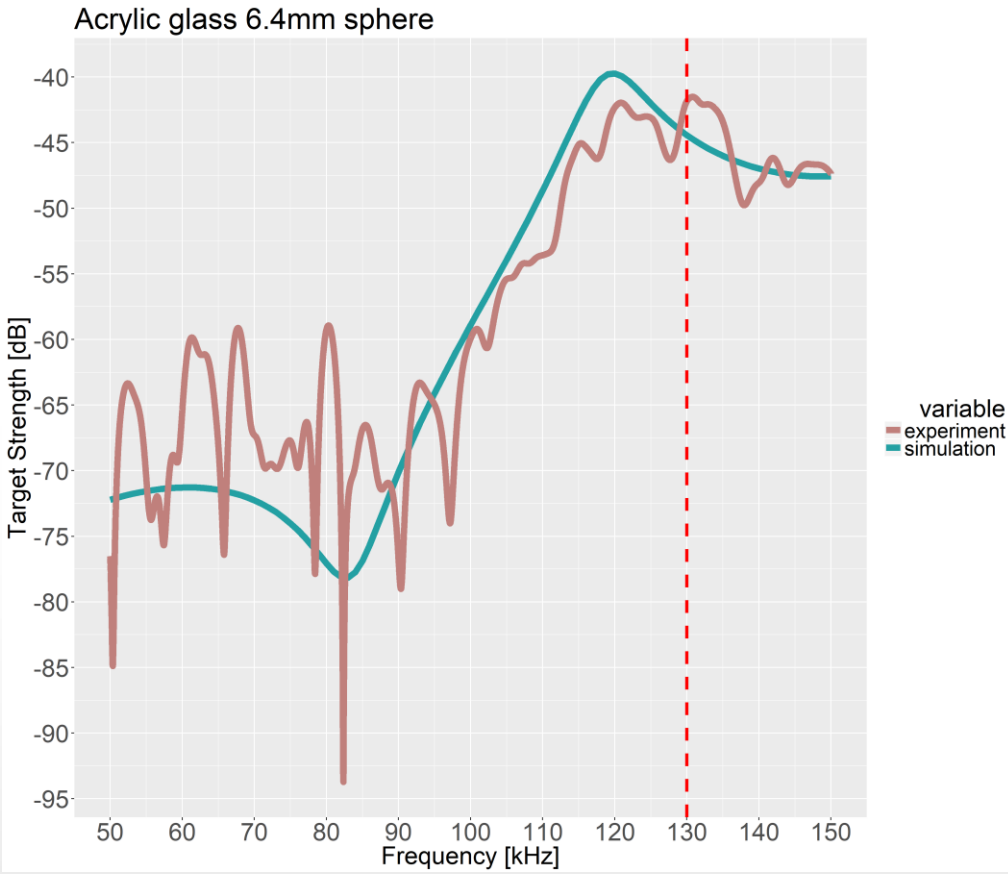
TS measurements

Results

Experiment vs simulation





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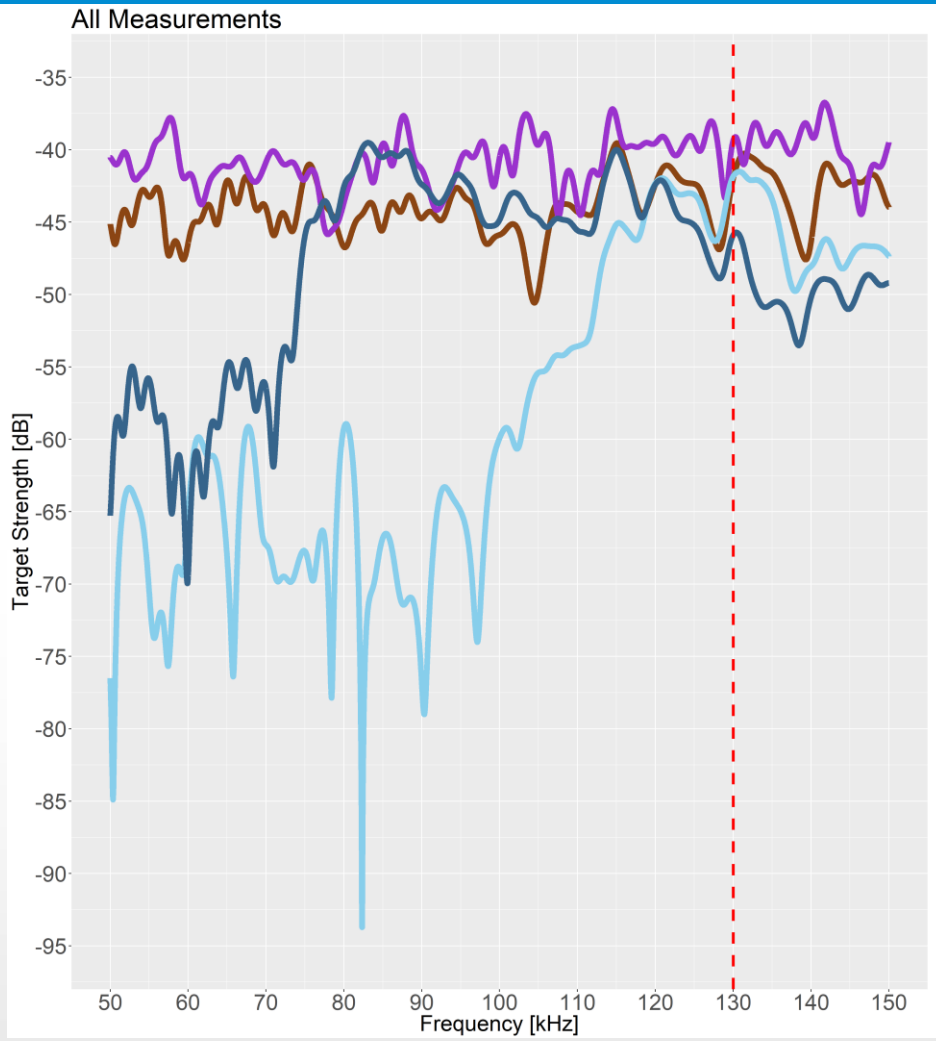

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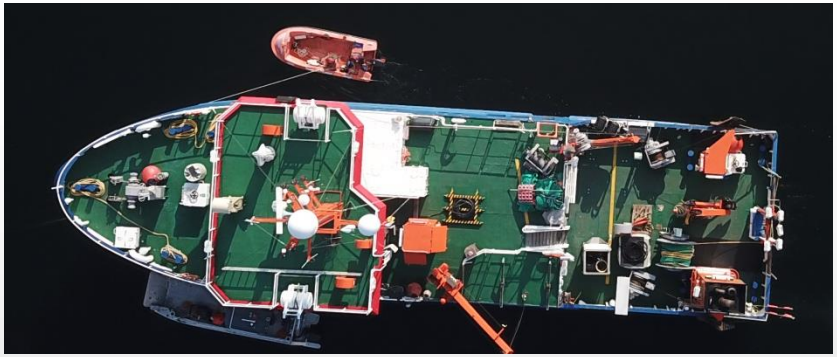
Echograms



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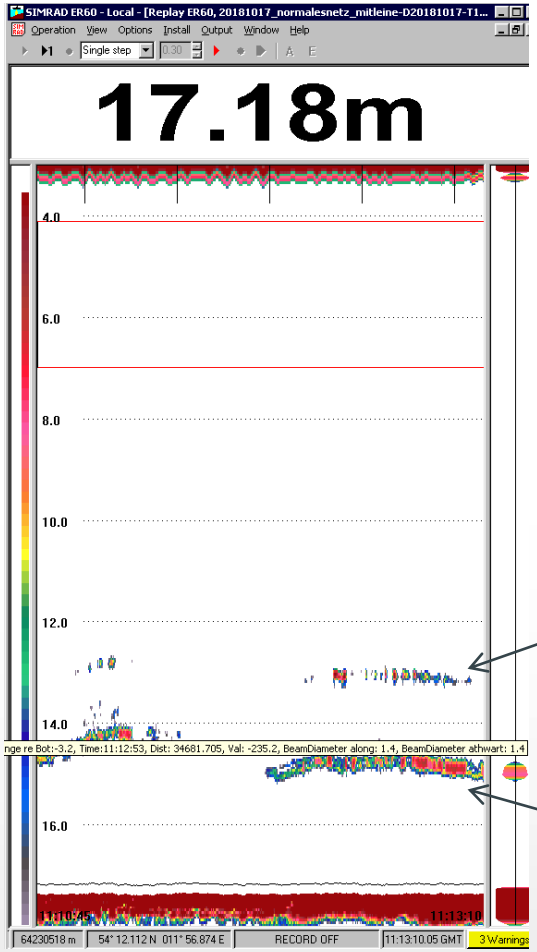
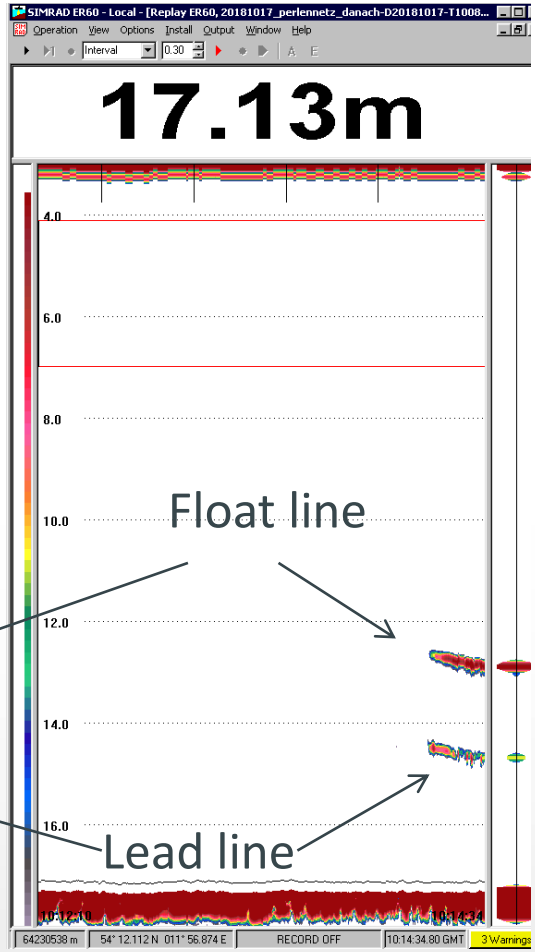
Echograms

38kHz



Standard gillnet



Modified gillnet

- No resonance effect at 38kHz

→ No visible difference

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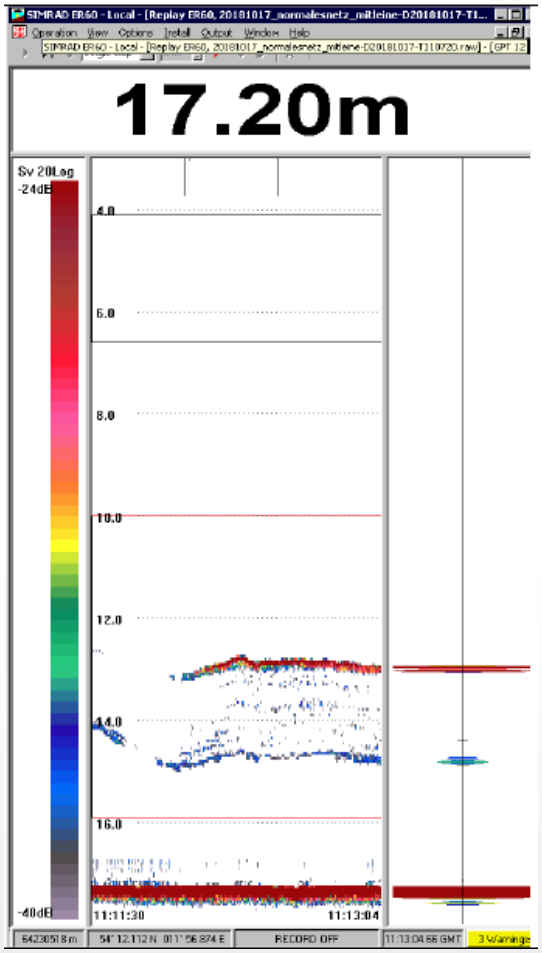
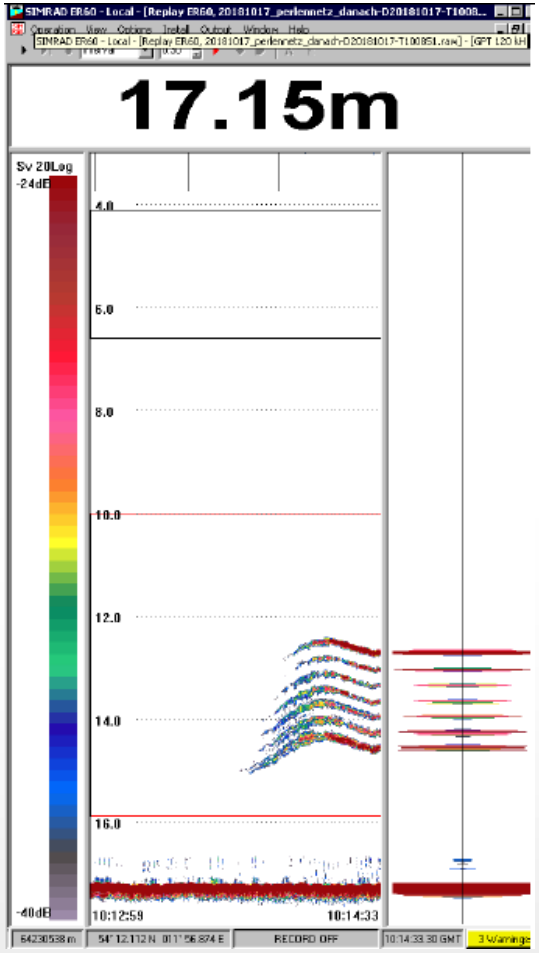
Echograms

120kHz



Standard gillnet



Modified gillnet

- Resonance of pearls → highly visible rows

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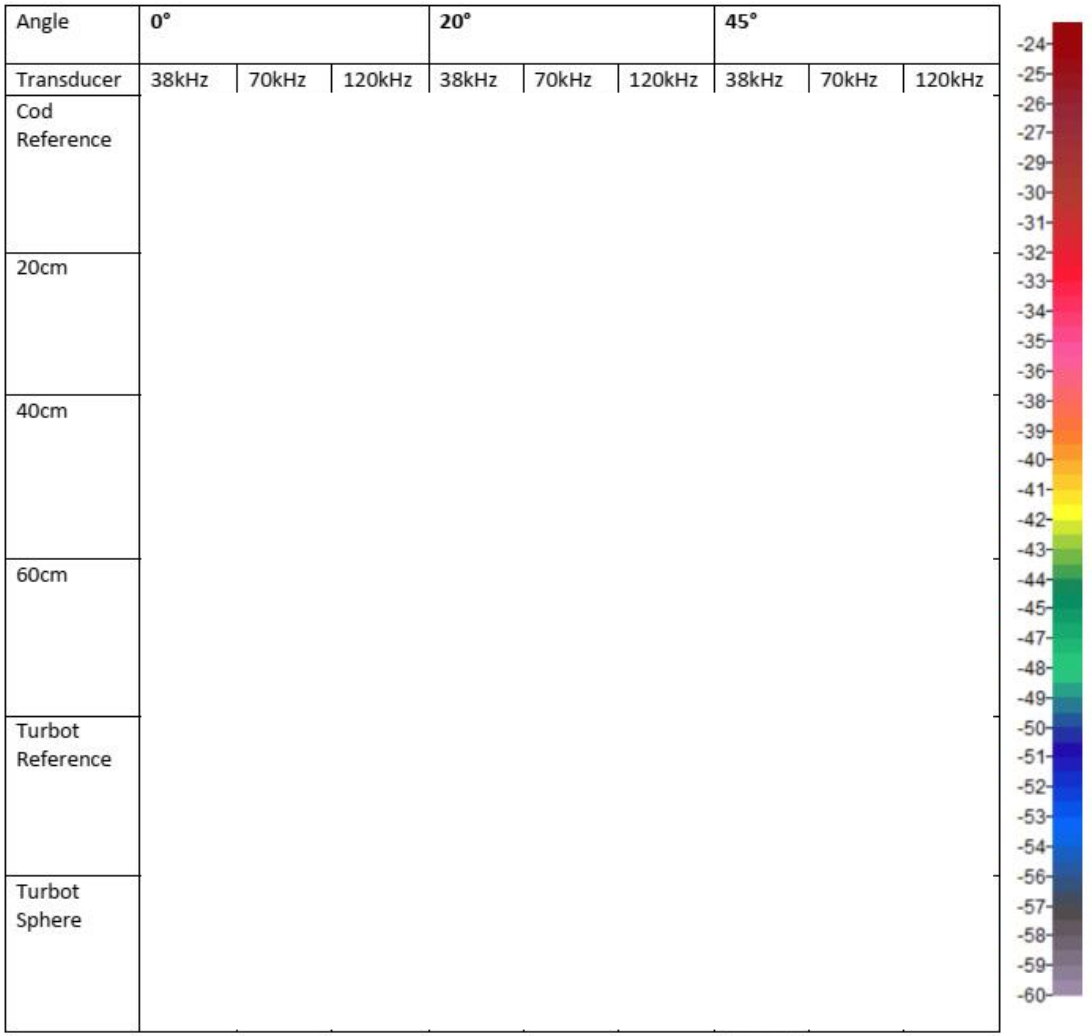
Echograms

- Systematic trials in tank
- Whole frequency range
- Three angles
- Several gillnet modifications



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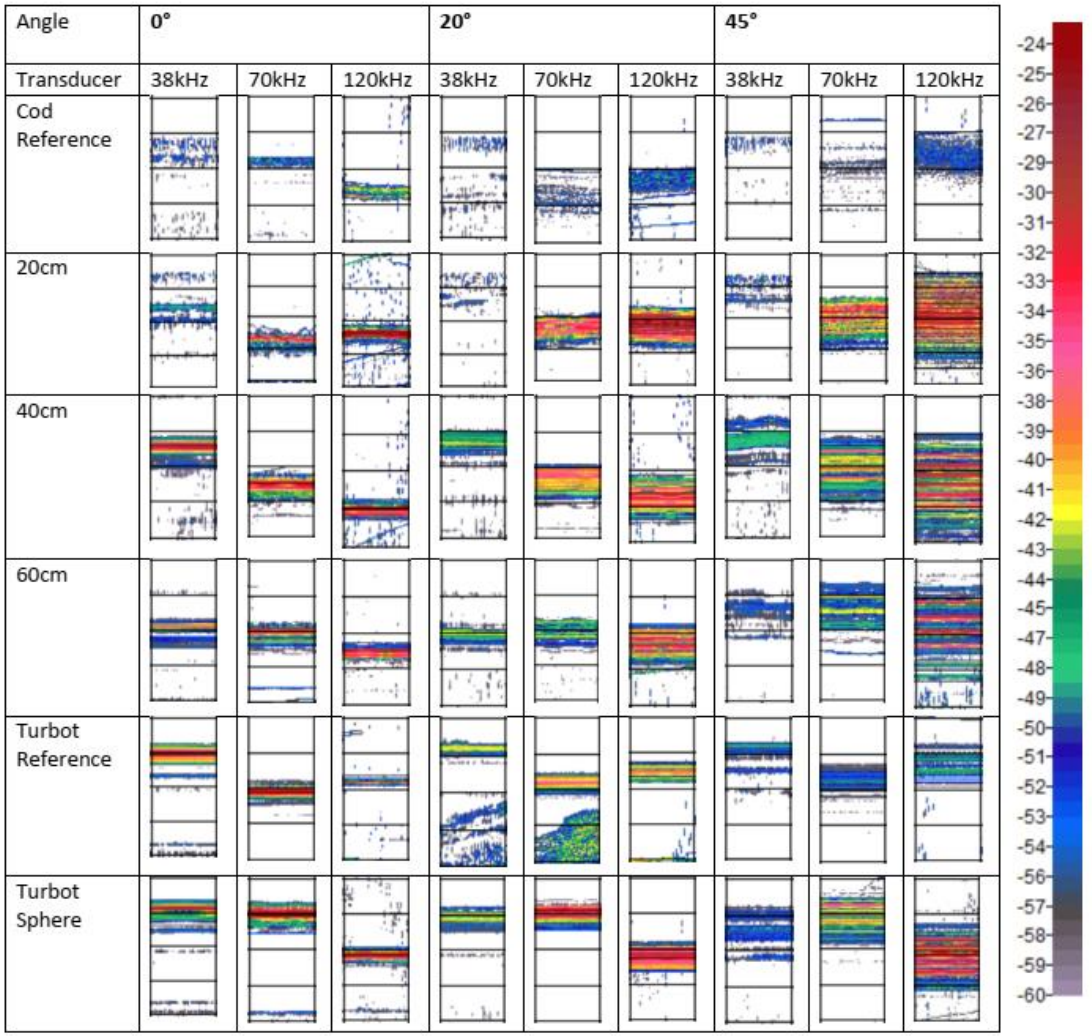

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Behavioral Experiment

No Net

vs.

Standard net

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Behavioral Experiment

No Net

vs.

Standard net

vs.

Pearl net

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Commercial trials

- Black Sea turbot fishery
- Higher bycatch rates than in the Baltic
- 2 km standard vs 2 km modified

Commercial trials

- Black Sea turbot fishery
- Higher bycatch rates than in the Baltic
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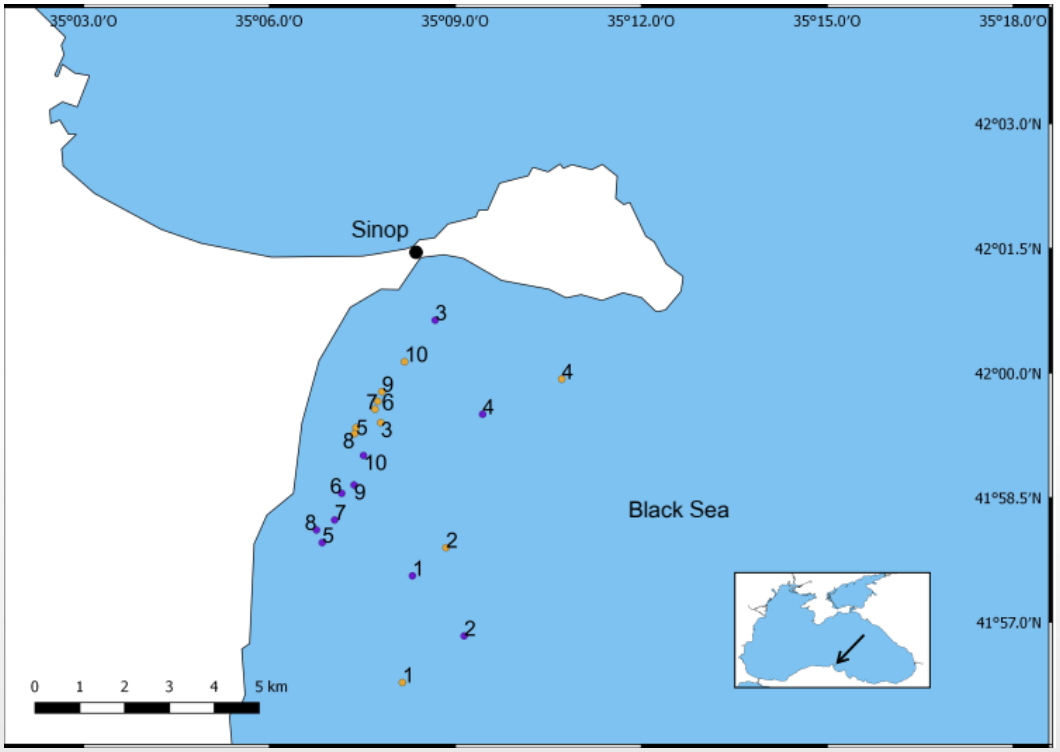

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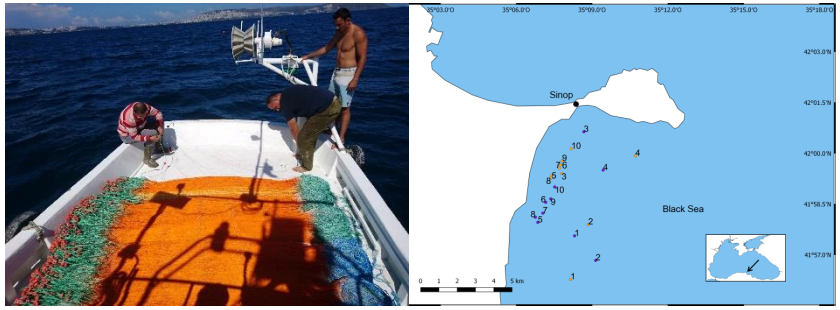


- Fewer porpoises in modified net, however no statistical significance
- Reasons: no echolocation? Echolocation in wrong direction? Noise?

Next steps

- Repeat behavioral experiment to observe porpoises around gillnets
- Further trials in other commercial fisheries?
- Development of automated process of „pearl net“ production

Collaborations are more than welcome, we are happy to provide any information needed for trials with the nets

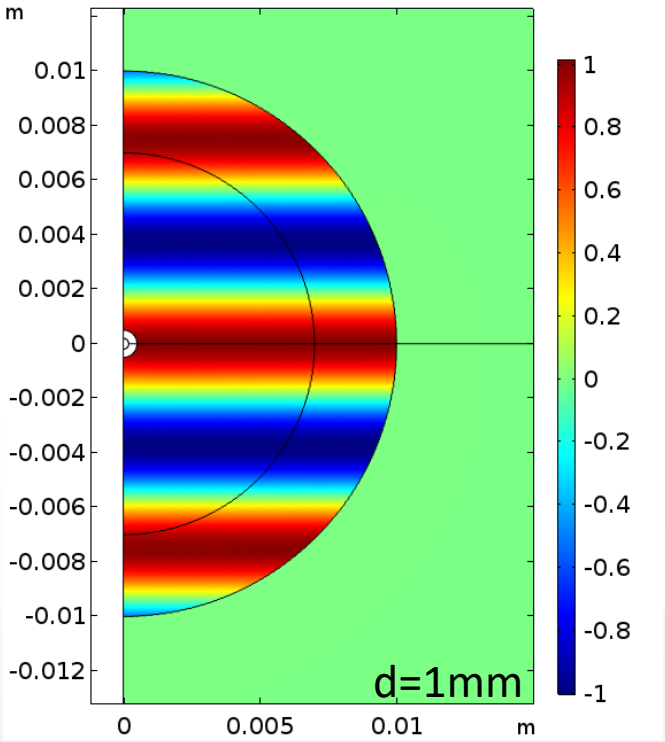
Please reach out:

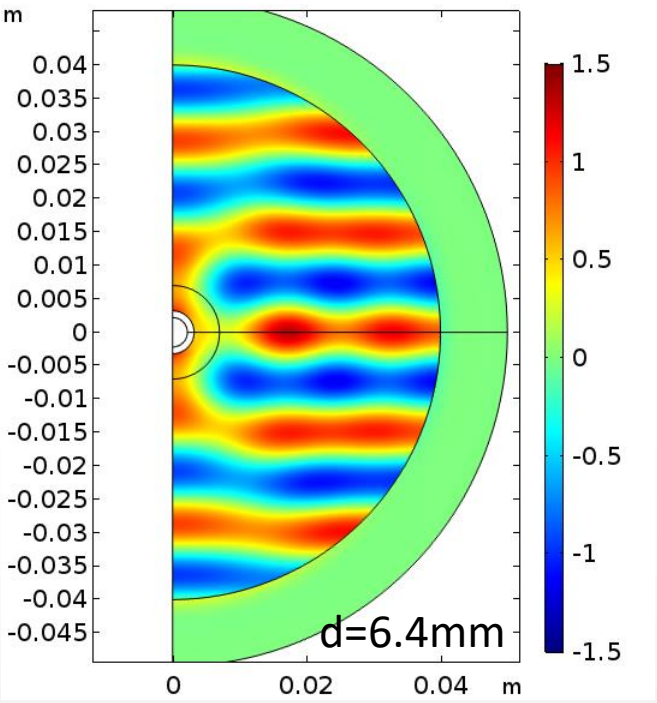
isabella.kratzer@thuenen.de

Simulation

appendix

Resonance – acoustic field





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