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BUILDING ACOUSTICS

AIRBORNE NOISE WITH FLANKING TRANSMISSION

Lausanne, 23. October 2018

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OVERVIEW

- Basis
- Motivation
- Method
- Results
- Outlook

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OVERVIEW

- Building acoustics aims at improving noise insulation between different zones, e.g. zwo flats
- Building acoustics is calculated between 100 and 3‘150 Hz
- A lot of problems stem from < 100 Hz
- Massive constrcutions a bit easier to calculate than wooden constructions

STANDARD AND NORMS

- Prediction: EN ISO 12354-1 to -6
- Measurement: EN ISO 16283-1 to 3
- Weighing: ISO 717-1 to 2

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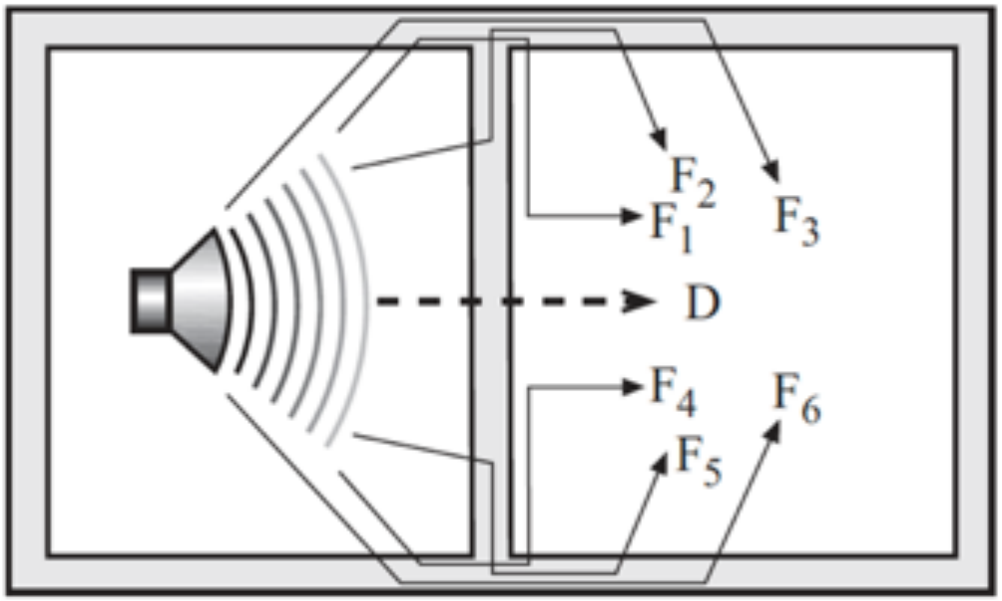
BUILDING ACOUSTICS WITH FLANKING TRANSMISSION



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MOTIVATION

- For normal building acoustics, SEA is used
- Problems in the area < 200 Hz not properly solvable
- More exact, but more difficult
- Room/building geometry taken into account
- Based on physics, not models

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GOAL

- Develop a model for 2D and 3D
- Develop a template
- Compare with measurements

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CALCULATION

Standardised level difference (field) $D_{n,T}(f) = L_{p,send}(f) - L_{p,rec}(f) + 10\log\left(\frac{T_{60}(f)}{T_{0(0.5s)}}\right)$

$$\overline{L_p}(f) = 10\log\left(\frac{1}{n}\sum_{i=1}^{n} 10^{\frac{L_{p,i}}{10}}\right)$$

$$\mathrm{D}(f)[\mathrm{dB}] = \overline{L_{p,send}}(f) - \overline{L_{p,rec}}(f)$$

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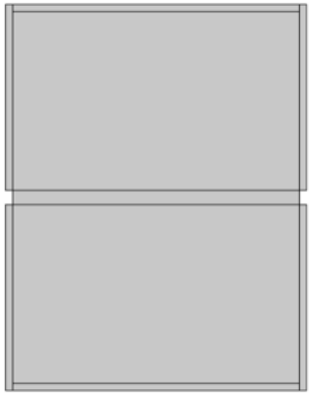
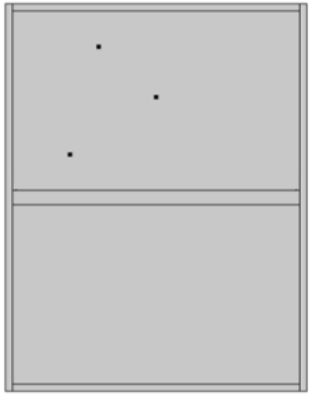
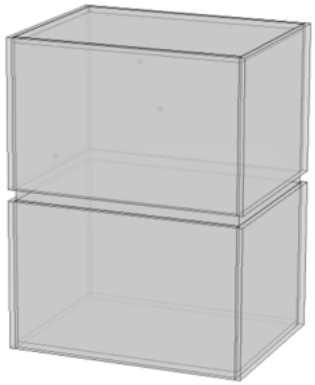
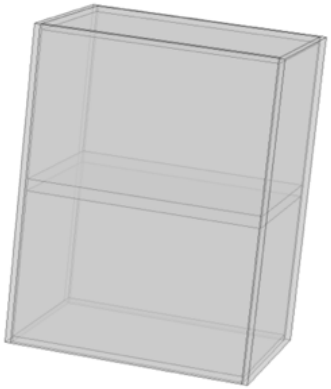
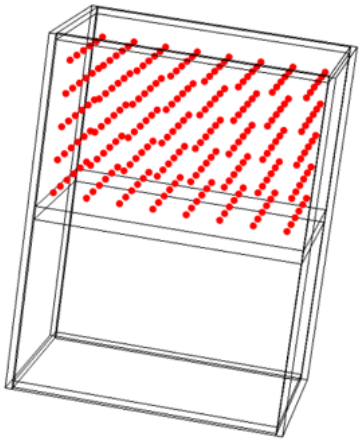
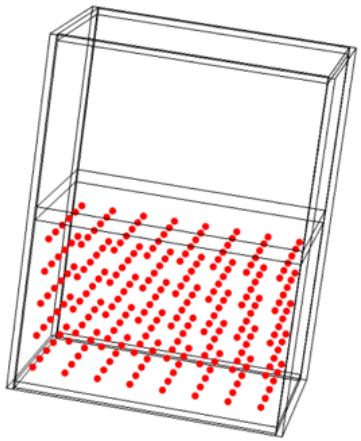
MODELS

- 2D Model and 3D Model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MODEL VARIATIONS

Name	2D/3D	Comments
REF (1a)	✓ / ✓	Bare concrete floor and discontinuous concrete walls (no flanking transmiss.)
2a	✓ / ✓	Same as the REF but considering continuous walls (i.e. flanking transmission)
2b	✓ / ✓	Same as 2a with a 0.05 thick plywood topfloor (and a 3 cm gap with the walls)
2c	✓ / ✓	Same as 2b with the long walls made of plywood instead of concrete
2d	✓ / ✓	Same as 2c with a 0.1 m thick concrete-suspended-ceiling (cavity 0.05 m)
2e	✓ / ×	Same as 2d with gypsum linings on all the walls.

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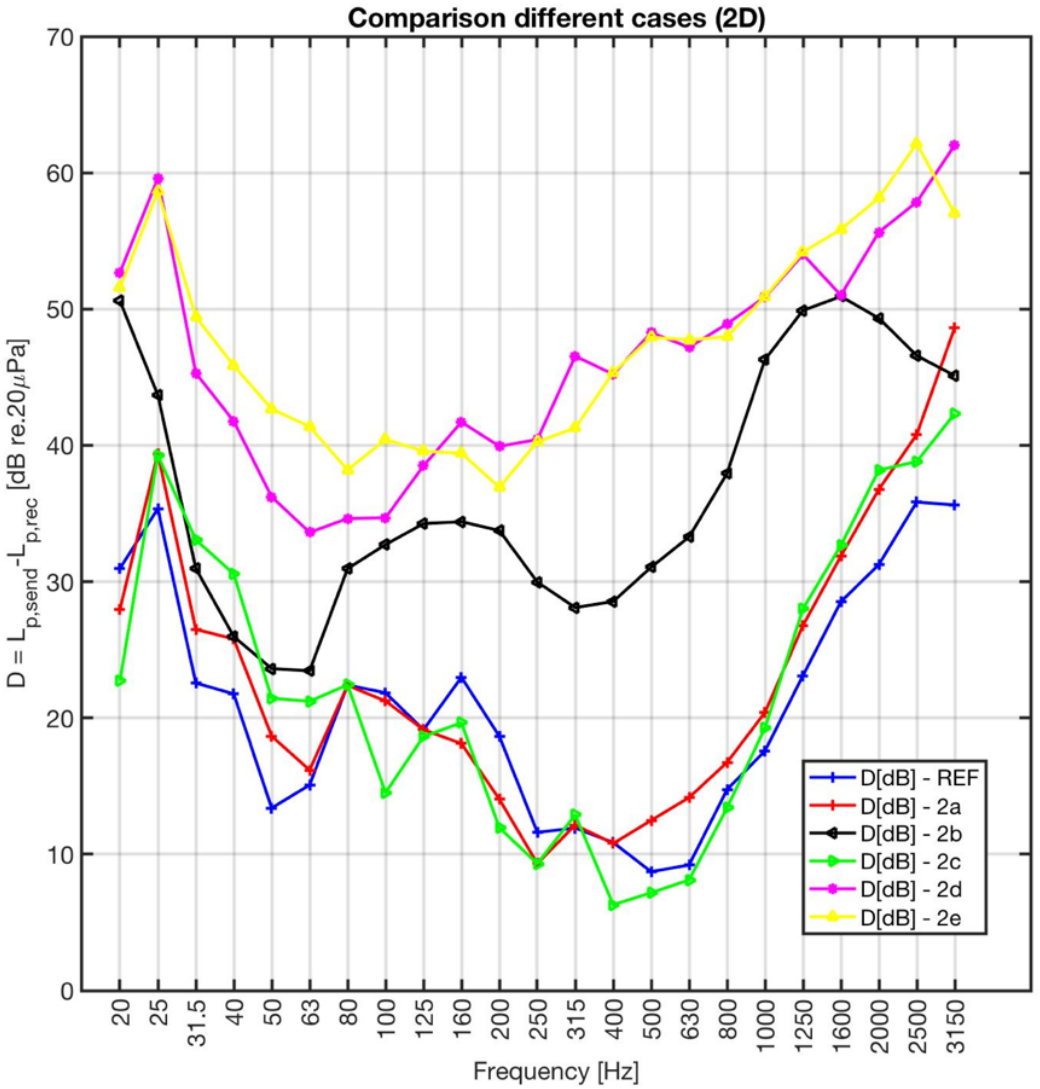
RESULTS 2D



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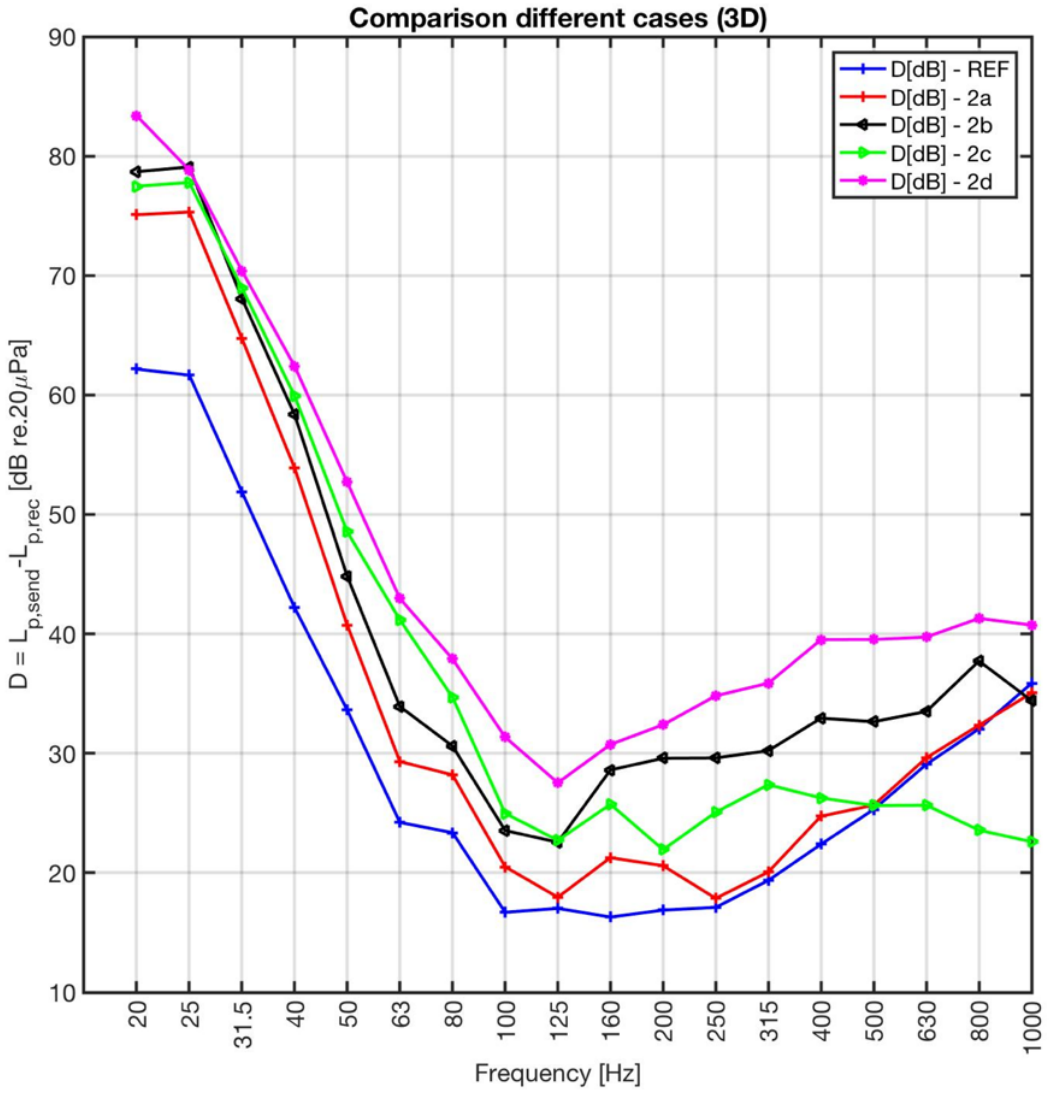
RESULTS 3D



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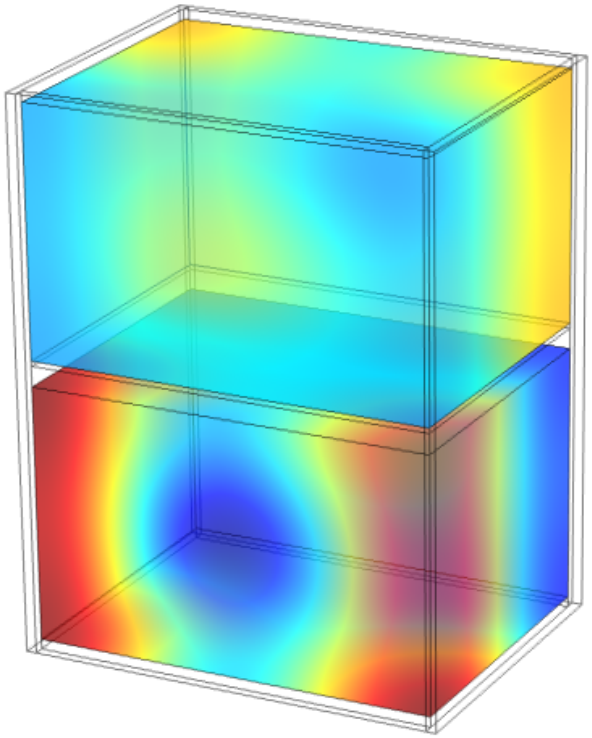
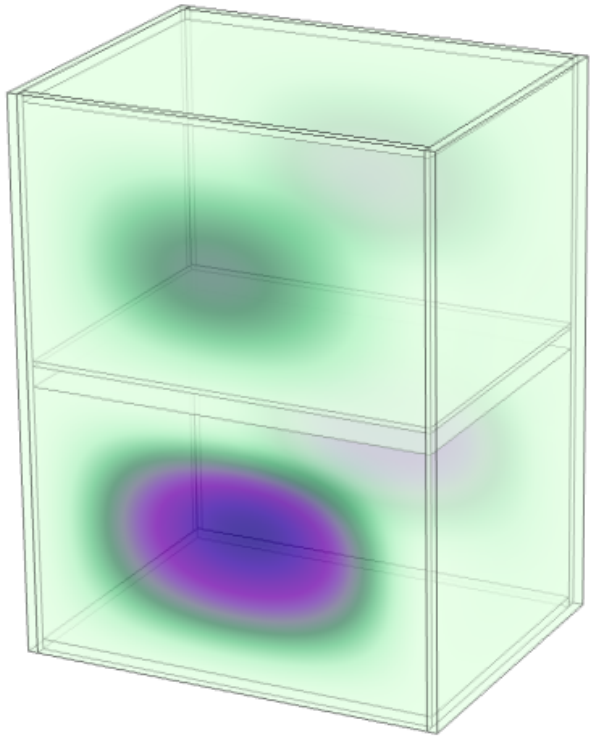
RESULTS 3D





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OUTLOOK

- Refine models, not just boxes
- Create models for real buildings and compare to measurements
- More variations with suspended walls and ceilings
- Wooden constructions