TTT4180 Technical Acoustics - Assignment 7

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Introduction

This assignment in the Technical Acoustics course (TTT4180) revolves around the transmission-line matrix (TLM) simulation technique used for acoustic waves and studying a variety of acoustic wave propagation scenarios by simulation. The report is split into two parts, where the first part provides a brief description of methods used for an own implementation of TLM simulation in Python. After, some results are presented and discussed, which were generated from said implementation. The second part contains further analyisis of sound pressure with respect to distance, surface reflections, and the effect of a noise screen on the sound pressure level. Instead of using the own implementation, this part uses a given Matlab implementation called TLMfig. Lastly, the report gives a brief outlook with a discussion of difficulties encountered during this assignment and final conclusions.

1 Python Implementation

To analyze the propagation of a wave in a pipe a 2D TLM implementation was needed. Python was chosen, as it provides all of the necessary features in libraries such as Numpy for arrays and linear algebra and Matplotlib for plotting the results.

1.1 Methods

The implementation is strongly based on the article provided with the assignment that describes TLM [1]. Nevertheless the most significant parts will be described in this section.

The main idea is to replace the continuous space with a mesh of so-called nodes, as shown in Fig. ??.

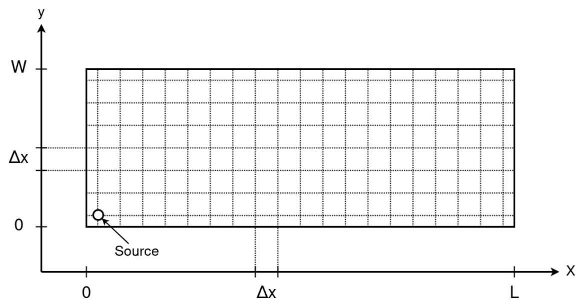

Figure 1: Example for TLM mesh placed on a pipe with dimensions L×W

1.2 Results

1.3 Discussion

2 TLMFig

2.1 Results

2.2 Discussion

3 Conclusion

4 References

References

[1] Y. Kagawa, T. Tsuchiya, B. Fujii, and K. Fujioka. Discrete huygens' model approach to sound wave propagation. *Journal of Sound and Vibration*, 218(3):419–444, 1998.