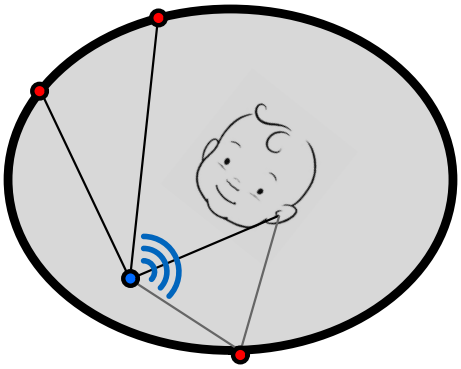
Chair of Vibroacoustics of Vehicles and Machines
TUM School of Engineering and Design
Technical University of Munich

Master Thesis

Listen to what a baby hears - Investigating the sound field before birth

Topic



Currently, up to 50% of all premature infants suffer from hearing and speech recognition disabilities. Here, the state-of-the-art research gives evidence that this circumstance results, besides other additional factors, from the sudden change of the sound environment. Inside the womb the infant is placed in a natural liquid while being exposed to air after birth. Furthermore, it is well-known that the acoustic environment for a baby inside the womb is defined by sound sources such as heart beat, blood vessel flow, digestion as well as external sources, e.g. speech, music, etc. However, it is still unknown what an infant hears exactly because for obvious reasons it is not possible to place microphones at the infants ear position. Here, numerical simulations offer interesting insights into the sound propagation within a womb.
Therefore, to deeper understand the acoustic field before birth appropriate models need to be developed. With this work, it will be possible to derive propagation models in a womb which will further facilitate experimental measurements that are safe for both the mother and the child and will help to understand the sound experience of infants before birth. If outstanding results can be achieved, it is intended to publish the work in an international journal.

Tasks

- Literature research
- Developing a first stage FEM model of a womb
- Analyzing the sound radiation inside a womb
- Identifying possibilities for back propagation to infants ear

Requirements

- High interest in cutting edge research
- High interest in theory, sound, vibration, wave propagation
- Solid knowledge of math and engineering mechanics

Additional Information

- Basic literature available at the chair
- Courses in dynamics, vibro-acoustics, computational acoustics, system dynamics and other related courses beneficial

English or German language is possible for this work.

TUM Contact Person

Dr.-Ing. Marcus Mäder
Chair of Vibroacoustics of Vehicles and Machines
TUM School of Engineering and Design
Technical University of Munich
Marcus.Maeder@tum.de