

---

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Motivation . . . . .	1
1.2	Outline of the thesis . . . . .	1
<b>2</b>	<b>Literature and overview of similar or related effects</b>	<b>4</b>
<b>3</b>	<b>Measurements of diffuse field absorption of the human body</b>	<b>7</b>
3.1	Measurement setup . . . . .	7
3.2	Results . . . . .	10
3.3	Discussion . . . . .	11
<b>4</b>	<b>Analytical models</b>	<b>14</b>
4.1	A one-dimensional model of an audience as a group of hard upright cylinders . . . . .	14
4.2	Waves in an audience of finite depth . . . . .	17
4.3	Audience with variable concentration . . . . .	22
4.4	Waves in an infinite layer of an audience on a rigid floor . . . . .	27
<b>5</b>	<b>BEM-Simulations</b>	<b>34</b>
5.1	BEM-simulation layout . . . . .	35
5.2	BEM-simulation results . . . . .	35
5.2.1	Rectangular geometry, concentration 2.6 pers./m <sup>2</sup> . . . . .	35
5.2.2	Rectangular geometry, concentration 1.3 pers./m <sup>2</sup> . . . . .	36
5.2.3	Circular geometry, density 2 pers./m <sup>2</sup> . . . . .	37
<b>6</b>	<b>Scale measurements</b>	<b>45</b>
6.1	Measurement setup . . . . .	45
6.2	Results . . . . .	46
<b>7</b>	<b>Live concert measurements</b>	<b>49</b>
7.1	Live measurement technique . . . . .	49
7.1.1	Background . . . . .	49
7.1.2	Accuracy of program signal measurements . . . . .	53
7.1.3	Comparison with a sweep measurement . . . . .	53
7.2	Discussion . . . . .	55
7.3	Live measurement setup . . . . .	56

7.4	Results for different densities . . . . .	57
7.5	Discussion . . . . .	57
<b>8</b>	<b>Comparison and discussion</b>	<b>60</b>
8.1	BEM-simulation vs. scale measurement . . . . .	60
8.2	BEM-simulation vs. analytical solution . . . . .	60
8.3	Verification through live measurements . . . . .	61
<b>9</b>	<b>Conclusions and outlook</b>	<b>65</b>
	<b>Bibliography</b>	<b>67</b>
	<b>Acknowledgements</b>	<b>70</b>
	<b>CV</b>	<b>71</b>