

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Room acoustics: Measurement and simulation</b>	<b>11</b>
2.1	Sound propagation in rooms . . . . .	11
2.2	Prediction models . . . . .	13
2.2.1	Room simulation based on geometrical acoustics . . . . .	14
2.2.2	Validation of GA models . . . . .	16
<b>3</b>	<b>Scene database</b>	<b>19</b>
3.1	Concept . . . . .	20
3.2	Reference measurements . . . . .	21
3.3	Scene descriptions . . . . .	22
3.4	Sound sources . . . . .	44
3.5	Receivers . . . . .	48
3.6	Geometry . . . . .	48
3.7	Boundary conditions . . . . .	50
3.7.1	Absorption coefficients . . . . .	51
3.7.2	Scattering coefficients . . . . .	53
3.8	Discussion . . . . .	54
3.8.1	Input data . . . . .	55
3.8.2	Frequency range limitations . . . . .	57
3.8.3	Reproducibility of measurements . . . . .	59
<b>4</b>	<b>Round robin comparison for uninformed simulations</b>	<b>63</b>
4.1	Method . . . . .	63
4.2	Participating simulation tools . . . . .	64
4.3	Results of the simple scenes . . . . .	66
4.4	Results of the complex scenes . . . . .	77
4.5	Listening experiments . . . . .	89
4.6	Discussion and Summary . . . . .	91
4.6.1	Reference scenes . . . . .	93

4.6.2	Complex scenes . . . . .	95
<b>5</b>	<b>Informed simulation of reference scenes</b>	<b>99</b>
5.1	Selection of input data for informed simulations . . . . .	100
5.2	Calibration of the boundary conditions . . . . .	100
5.2.1	Target parameter: Reverberation time . . . . .	101
5.2.2	Target parameter: Energy histograms . . . . .	104
5.3	Informed simulations of selected scenes . . . . .	105
5.3.1	Simulation model and configuration . . . . .	106
5.3.2	Scene 1 (RS1): Single reflection (infinite plate) . . . . .	109
5.3.3	Scene 8 (CR1): Coupled rooms . . . . .	114
5.3.4	Scene 9 (CR2): Small room (seminar room) . . . . .	117
5.3.5	Scene 11 (CR4): Large room (auditorium) . . . . .	124
5.4	Discussion and Summary . . . . .	129
<b>6</b>	<b>Conclusion and Outlook</b>	<b>131</b>
<b>A</b>	<b>Additional BRAS data</b>	<b>135</b>
A.1	Scene descriptions . . . . .	135
A.2	Uncertainty and deviations in measured data . . . . .	139
<b>B</b>	<b>Additional round robin results</b>	<b>141</b>
B.1	Simple scenes . . . . .	141
B.2	Complex rooms . . . . .	145
<b>C</b>	<b>Additional data related to informed simulations</b>	<b>153</b>
C.1	Scene 1 (RS1): Single reflection (infinite plate) . . . . .	153
C.2	Scene 8 (CR1): Coupled rooms . . . . .	154
C.3	Reflection density of scene 9, 10 and 11 . . . . .	155
C.4	Scene 9 (CR2): Small room (seminar room) . . . . .	156
C.5	Scene 11 (CR4): Large room (auditorium) . . . . .	159
	<b>Bibliography</b>	<b>161</b>
	<b>Curriculum Vitae</b>	<b>181</b>
	<b>Acknowledgments</b>	<b>182</b>