

The Acoustics of Kabuki Theaters - Input Data for Room Acoustic Simulations

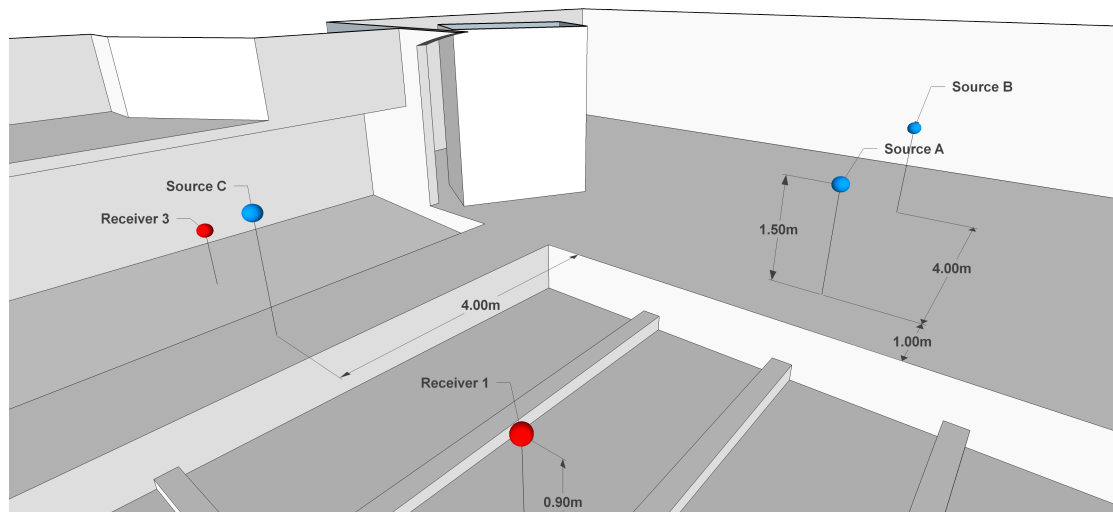
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General Information

This data set contains CAD-Models (.skp) of the eight following Kabuki theaters: Hoo-za, Kanamaru-za, Murakuni-za, Hakuun-za, Meiji-za, Yachiyo-za, Uchiko-za, Kaho Gekijo. The Models include source and receiver positions used in the measurements and simulations which are described in an accompanying article which is currently in peer review for *Acta Acustica united with Acustica*. If you use this data set please cite the reference, which will be given in DepositOnce under *related documents*, as soon as the article will have appeared.

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Data description

The room models were created using the Software SketchUp Make 2017¹. This version of the software is needed to view the models. The models are based on existing drawings and distance measurements obtained during in-situ measurements described in the aforementioned paper. For the Meiji-za, the Hakuun-za, the Uchiko-za, and the Kanamaru-za, plans and section cuts exported from laser scans² obtain in the rooms could be used to verify the drawings.

¹<https://www.sketchup.com/de/download/all>

²FARO Laser Scanner, Focus 3D S120, Scan setting: 43.7M (43,694,0880) points/scan, 6.136mm/10m, without color recording, 4 mins/scan average

In all rooms, the absorption coefficients displayed in table 1 were applied to the respective surfaces. In the Yachiyo-za, the Murakuni-za, the Kaho-Gekijo and the Hoo-za, the stagehouse was not completely included in all models but cut off at the point of the visible stage sets and a constant absorption coefficient of $\alpha = 0.8$ was assigned to the boundary surfaces.

Tabelle 1: Absorption coefficients that were applied to the stage, the pathway called the hanamichi, as well as the occupied and the unoccupied audience area

Material	Octave band center frequency in Hz						
	125	250	500	1000	2000	4000	8000
Stage, Hanamichi	0.25	0.17	0.12	0.09	0.0	0.10	0.05
Tatami, unoccupied	0.19	0.27	0.24	0.49	0.40	0.30	0.20
Tatami, occupied	0.33	0.60	0.85	0.95	0.97	0.92	0.84

To all other surfaces, the residual absorption coefficients shown in table 2 were applied, which are the result of adjusting the simulated reverberation times to match the measured reverberation times within the JND mentioned in ISO 3382 (rel. 5%).

Tabelle 2: Residual absorption coefficients, resulting from fitting the simulated reverberation times to the in-situ measurements

Material	Octave band center frequency in Hz						
	125	250	500	1000	2000	4000	8000
Hakuun-za	0.24	0.28	0.25	0.24	0.28	0.26	0.22
Hoo-za	0.25	0.23	0.30	0.21	0.26	0.26	0.23
Kaho Gekijo	0.22	0.19	0.25	0.19	0.17	0.15	0.15
Kanamaru-za	0.24	0.27	0.30	0.28	0.30	0.30	0.30
Meiji-za	0.27	0.30	0.30	0.27	0.27	0.25	0.26
Murakuni-za	0.11	0.09	0.13	0.09	0.14	0.14	0.14
Uchiko-za	0.29	0.28	0.27	0.21	0.23	0.21	0.21
Yachiyo-za	0.19	0.25	0.24	0.19	0.21	0.20	0.19

The simulation were carried out, using the software Odeon 11.23 Combined. In the software, the specified scattering at 707 Hz are extrapolated to a frequency function of rising scattering values increasing with frequency. For the occupied audience areas (Tatami, occupied), a scattering coefficient at 707 Hz of 0.7 has been applied. For all other surfaces, a value of 0.5 has been used.