BAB 5 KESIMPULAN DAN SARAN

5.1. KESIMPULAN

Berdasarkan hasil penelitian dan pembahasan yang telah dilakukan, dapat ditarik kesimpulan sebagai berikut:

1. Optimalisasi akustik pada ruang ibadah GPdI El-Asah Yogyakarta menghasilkan perubahan yang signifikan pada parameter akustik ruang.
    - Waktu dengung (RT60) berhasil diturunkan ke rentang nilai ideal, yaitu 1 - 1,4 detik, untuk mendukung kejelasan suara musik dan ucapan.
    - Kejelasan suara (C80) meningkat, menciptakan kondisi akustik yang lebih jernih, khususnya untuk musik.
    - Definisi suara (D50) meningkat, menunjukkan perbaikan dalam kejelasan suara, terutama untuk musik dan pidato.
    - Indeks Transmisi Ucapan (STI) meningkat ke kategori *excellent*, mengindikasikan bahwa kualitas transmisi ucapan dalam ruang ibadah telah dioptimalkan.
2. Perubahan parameter akustik setelah optimalisasi berkorelasi dengan perubahan aktivitas gelombang otak (alpha dan theta) pada subjek penelitian.
    - Peningkatan atensi dan fokus ditunjukkan dengan kecenderungan penurunan *bandpower* alpha pada sebagian besar subjek.
    - Peningkatan sensitivitas auditori ditunjukkan dengan kecenderungan peningkatan *bandpower* theta, terutama pada subjek dengan pengalaman akustik.
3. Terdapat perbedaan respons otak antara subjek jemaat lokal dan subjek dengan pengalaman akustik. Subjek dengan pengalaman di bidang musik atau audio menunjukkan sensitivitas yang lebih tinggi terhadap perubahan kualitas akustik.

5.2. SARAN

1. Penelitian Lanjutan

Perlu dilakukan penelitian lebih lanjut dengan jumlah subjek yang lebih besar dan metode pengukuran aktivitas otak yang lebih komprehensif (misalnya, menggabungkan EEG dengan fMRI) untuk memperkuat hasil penelitian ini. Penelitian

lanjutan juga dapat mengeksplorasi pengaruh faktor-faktor lain, seperti kenyamanan termal dan visual, terhadap pengalaman ibadah jemaat dalam konteks neuroarsitektur.

2. Implementasi Optimalisasi Akustik

Berdasarkan hasil penelitian ini, GPdI El-Asah Yogyakarta dapat mempertimbangkan untuk menerapkan optimalisasi akustik ruang ibadah lebih lanjut.

Hal ini dapat dicapai dengan menambahkan material penyerap suara pada dinding dan langit-langit, serta menyesuaikan posisi dan jenis *speaker*.

Pemanfaatan teknologi *sound system* yang lebih canggih juga dapat dipertimbangkan untuk meningkatkan kejelasan dan kualitas suara.

3. Referensi bagi Pengembangan Neuroarsitektur di Ruang Ibadah

Penelitian ini diharapkan dapat menjadi referensi bagi penelitian selanjutnya di bidang neuroarsitektur dan akustik ruang ibadah, khususnya dalam konteks *experiential worship*.

Temuan penelitian ini dapat membantu arsitek dan desainer dalam merancang ruang ibadah yang tidak hanya indah secara estetika, tetapi juga mendukung pengalaman spiritual jemaat melalui optimalisasi faktor-faktor neuroarsitektur.

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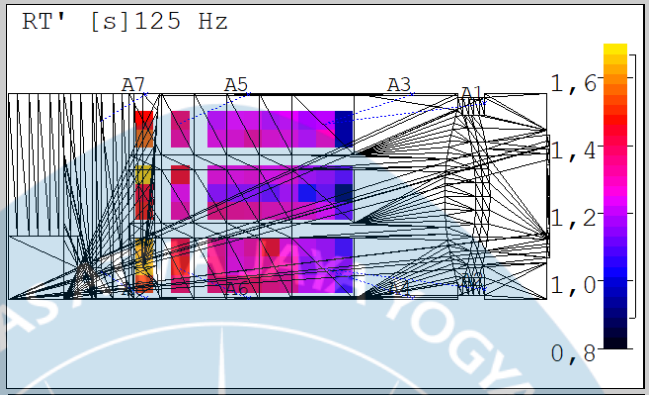
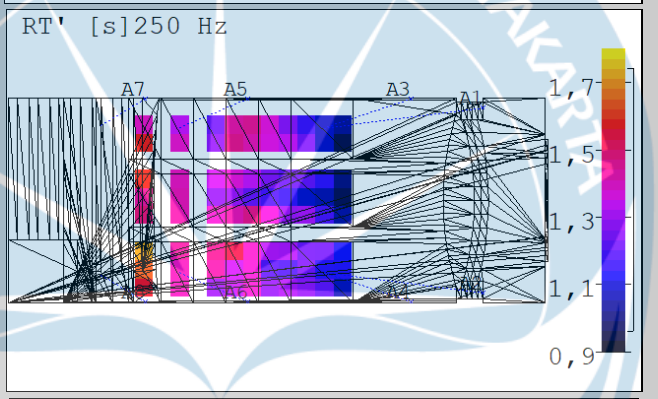
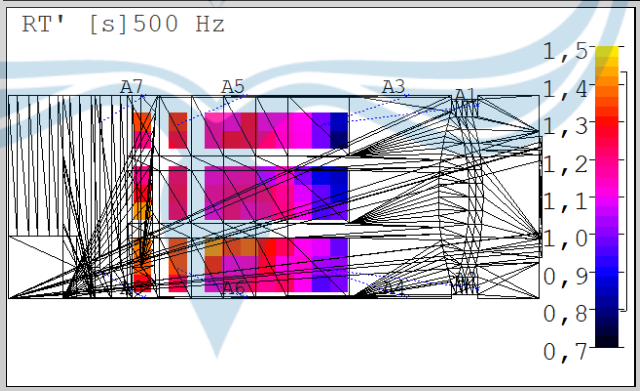
LAMPIRAN

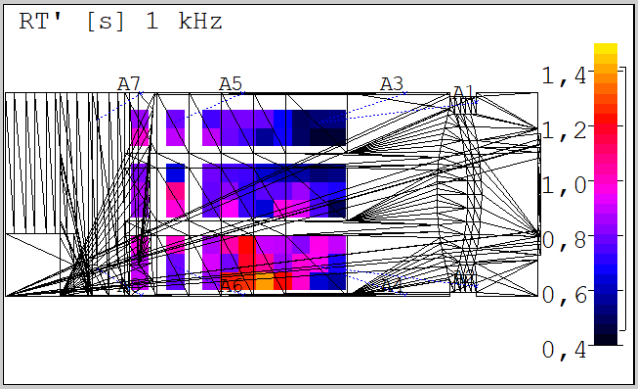
Hasil Simulasi Akustik 3D Model Eksisting

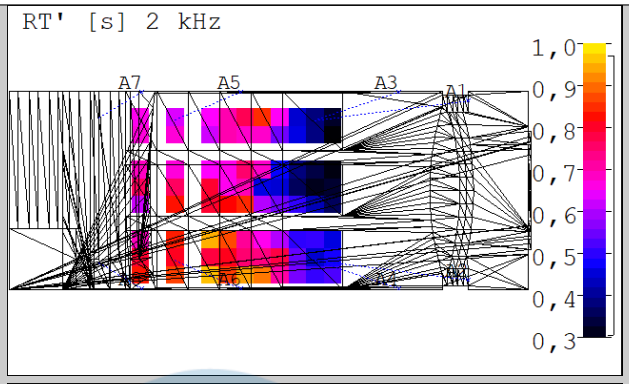
1. RT60 - Reverberation Time (s)

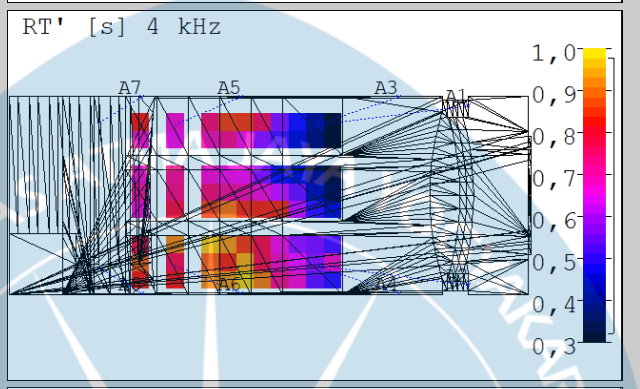


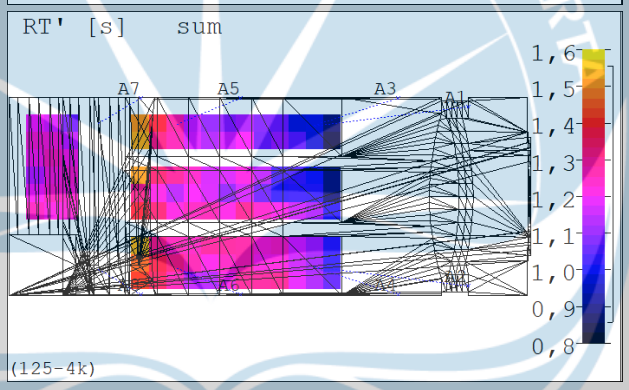




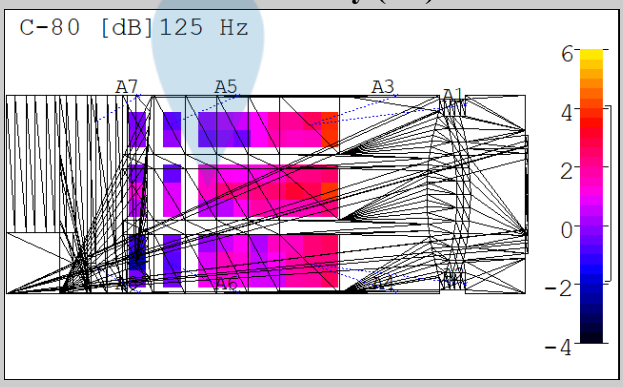


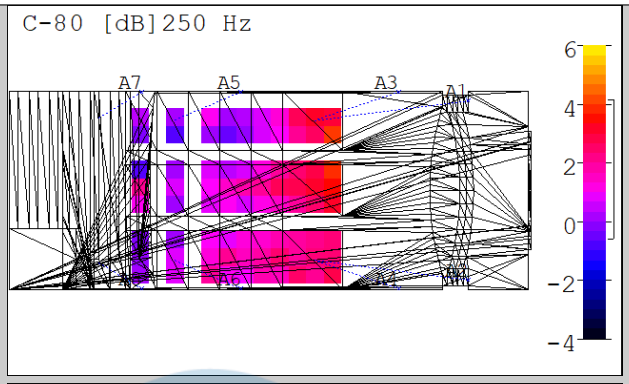


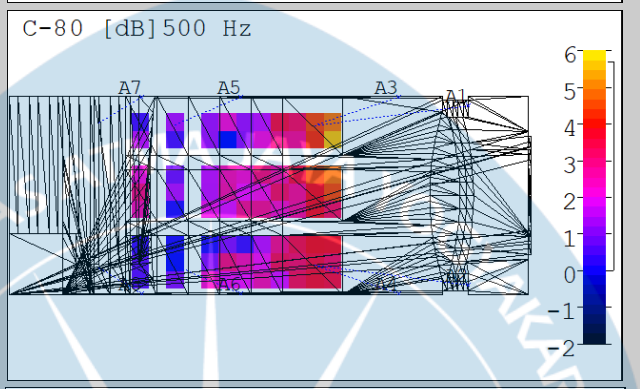


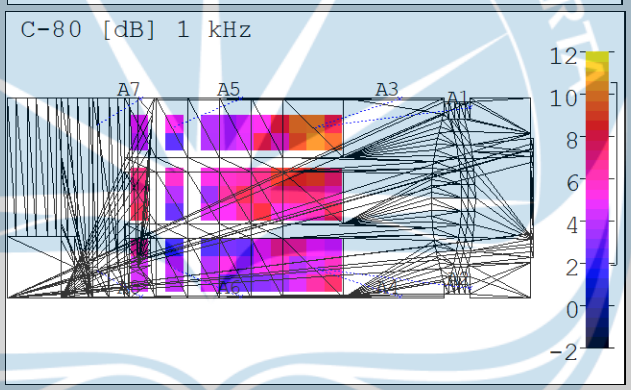


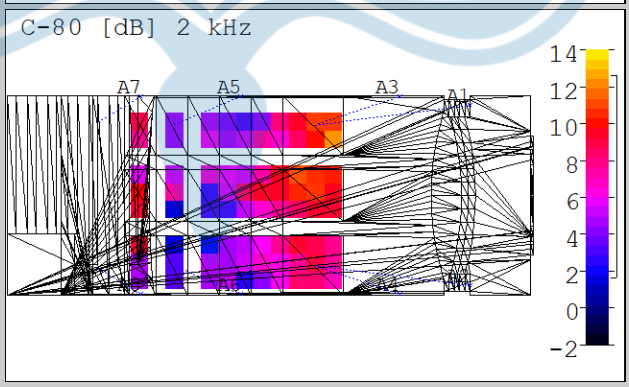
2. C80 - Clarity (dB)

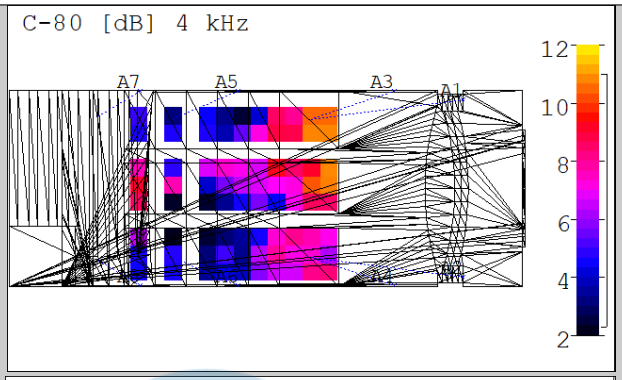


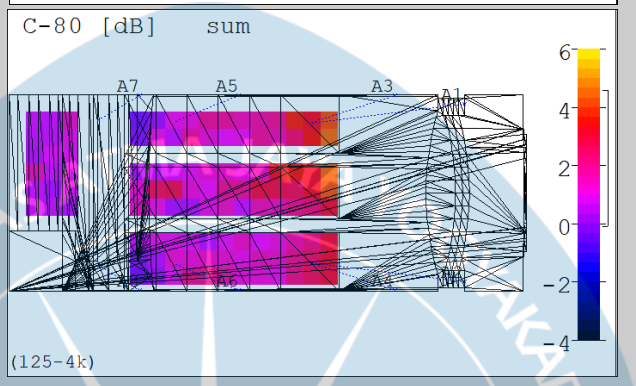

C-80 [dB]250 Hz
A7
A5
A3
A1
A6
A4
6
4
2
0
-2
-4


C-80 [dB]500 Hz
A7
A5
A3
A1
A6
A4
6
5
4
3
2
1
0
-1
-2

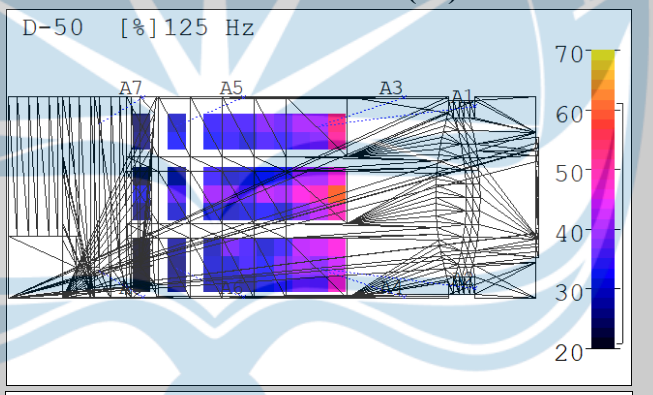

C-80 [dB] 1 kHz
A7
A5
A3
A1
A6
A4
12
10
8
6
4
2
0
-2

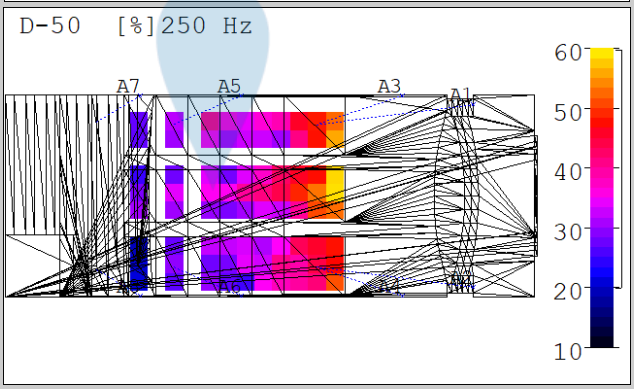

C-80 [dB] 2 kHz
A7
A5
A3
A1
A6
A4
14
12
10
8
6
4
2
0
-2

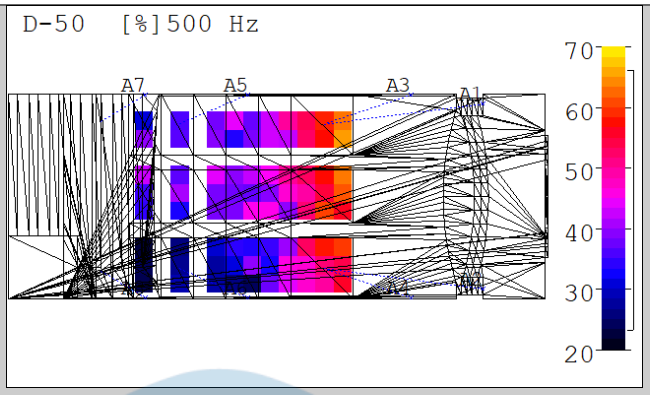


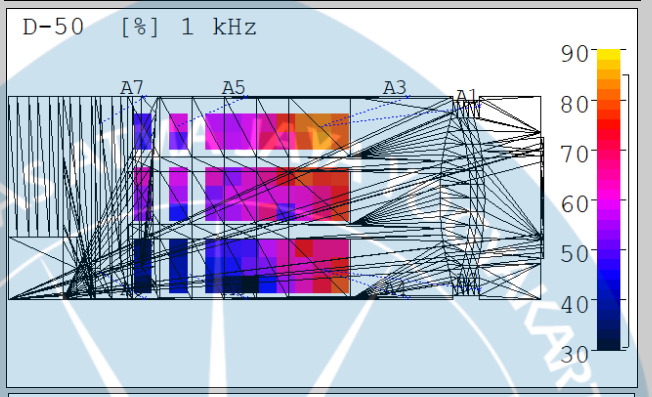


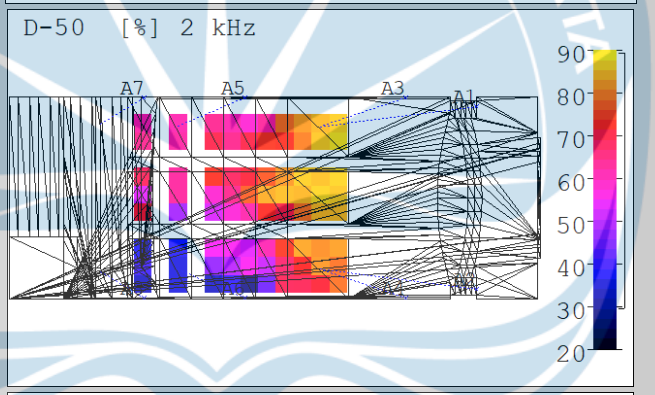
3. D50 - Definition (%)

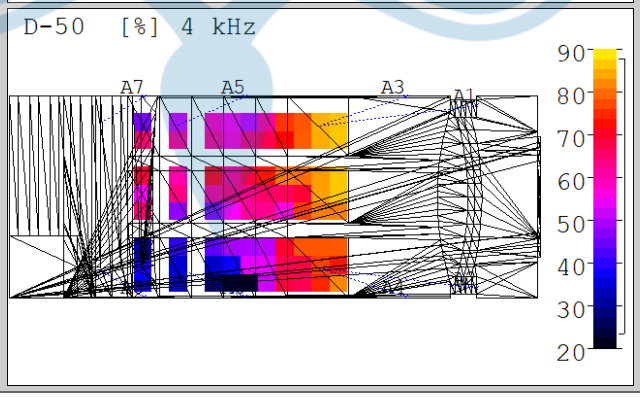


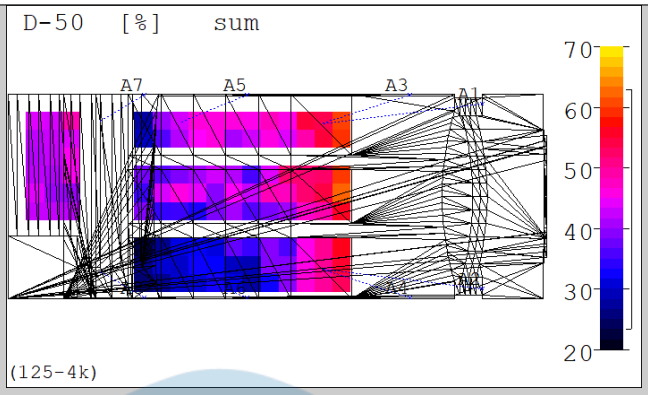



D-50 [%]500 Hz
A7
A5
A3
A1
70
60
50
40
30
20

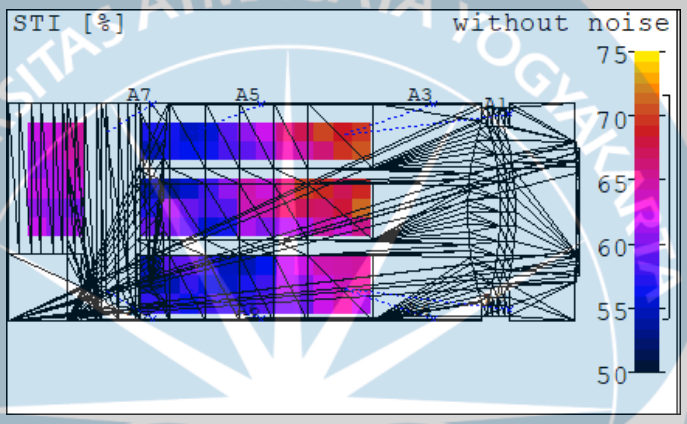

D-50 [%] 1 kHz
A7
A5
A3
A1
90
80
70
60
50
40
30

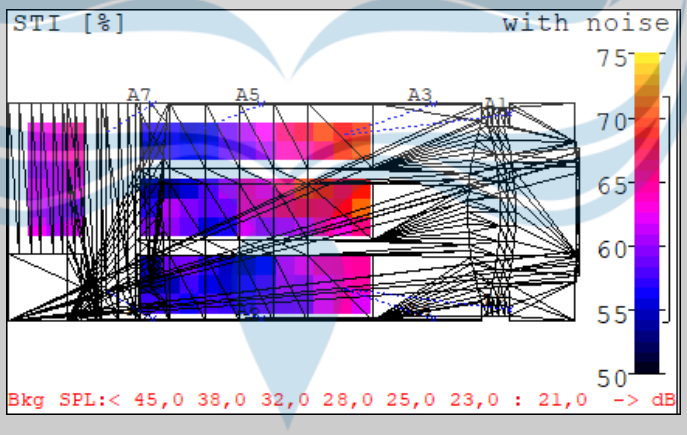

D-50 [%] 2 kHz
A7
A5
A3
A1
90
80
70
60
50
40
30
20

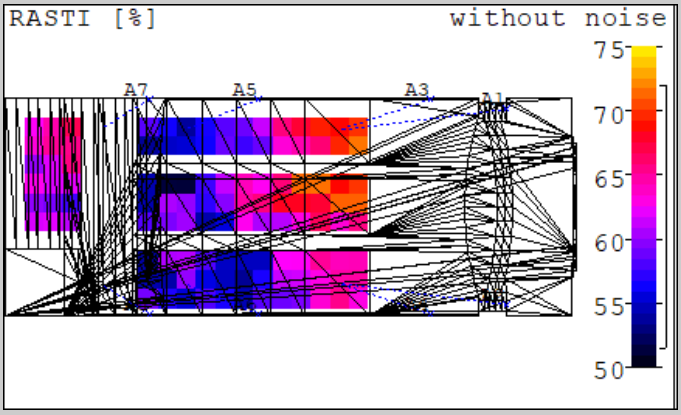

D-50 [%] 4 kHz
A7
A5
A3
A1
90
80
70
60
50
40
30
20

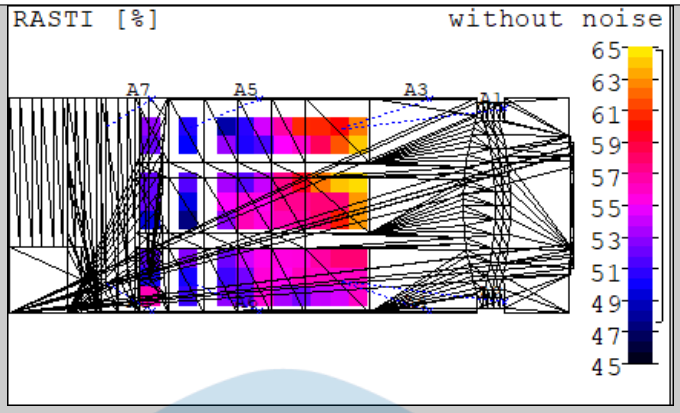


4. Speech Transmission Index (STI)

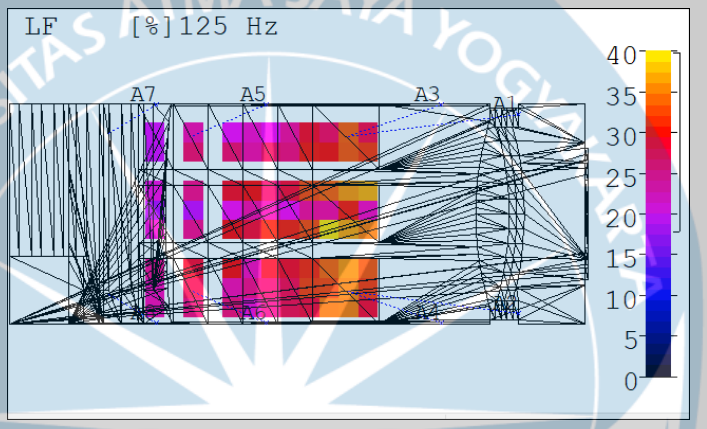


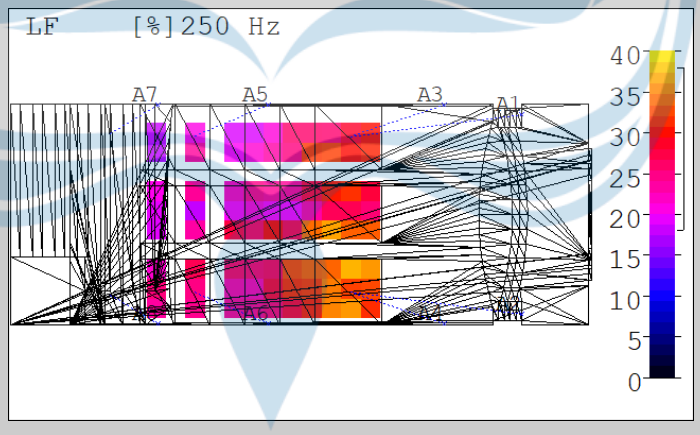


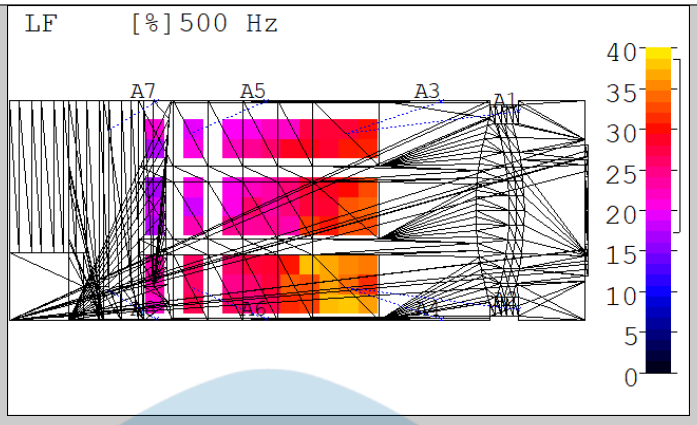


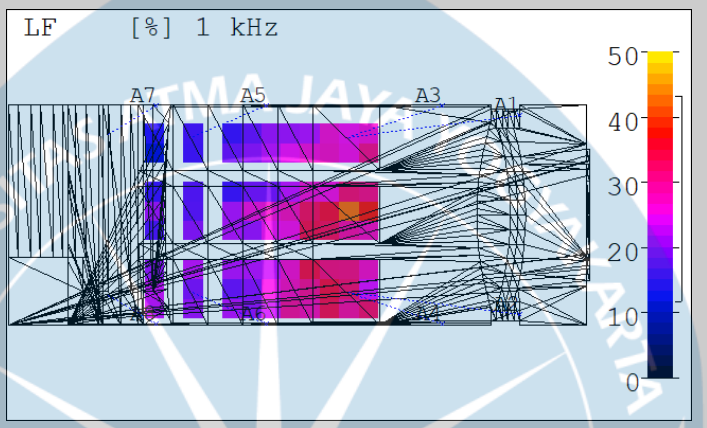


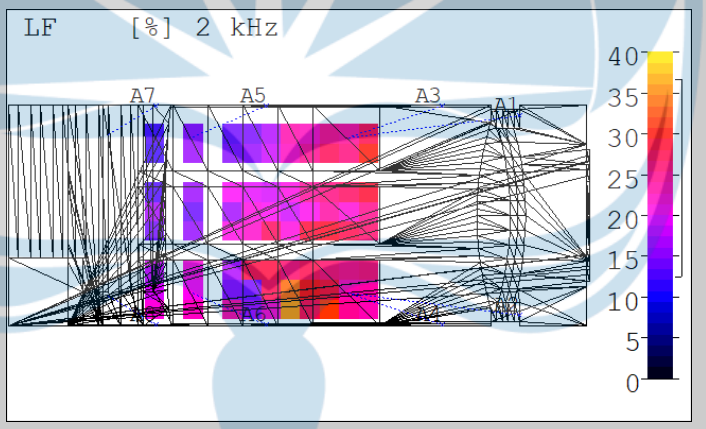
5. LF - Lateral Energy Fraction (%)

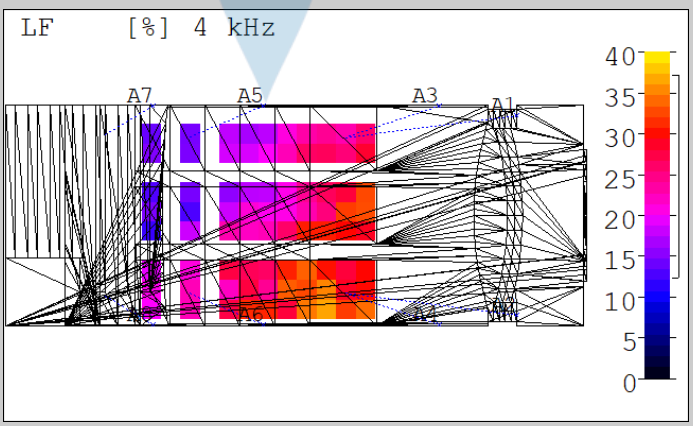


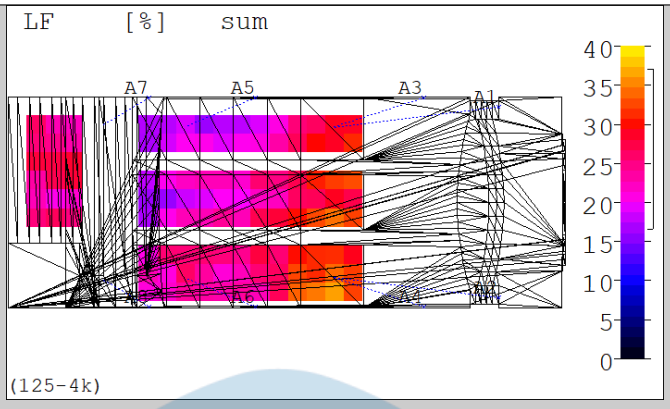



LF [%]500 Hz
A7
A5
A3
A1
A6
A4
40
35
30
25
20
15
10
5
0


LF [%] 1 kHz
A7
A5
A3
A1
A6
A4
50
40
30
20
10
0


LF [%] 2 kHz
A7
A5
A3
A1
A6
A4
40
35
30
25
20
15
10
5
0

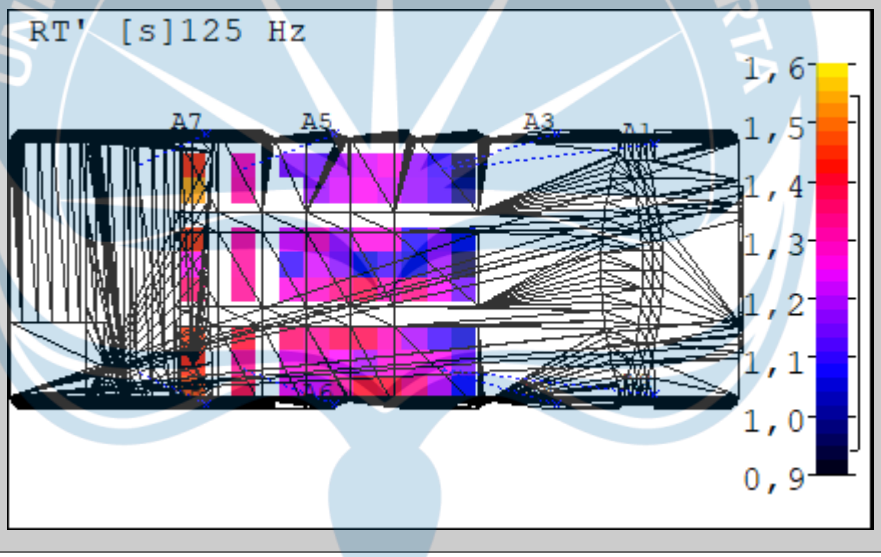

LF [%] 4 kHz
A7
A5
A3
A1
A6
A4
40
35
30
25
20
15
10
5
0

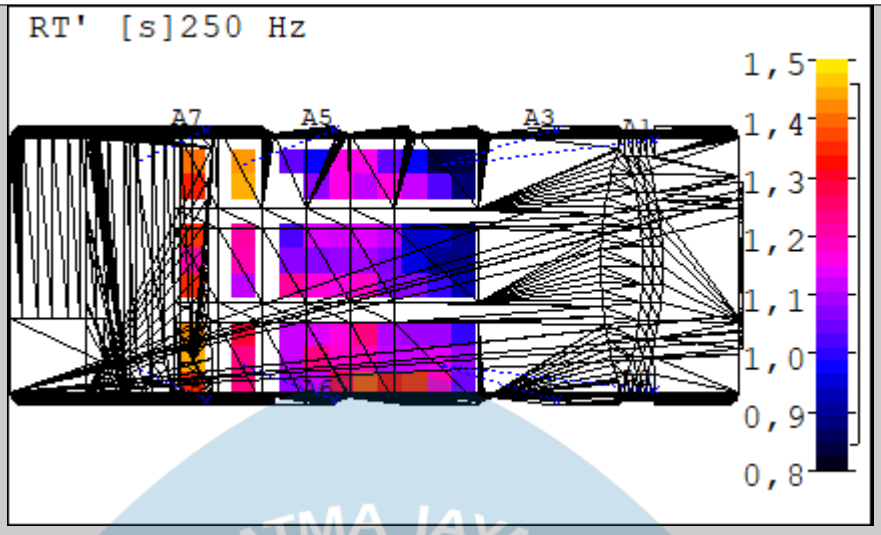


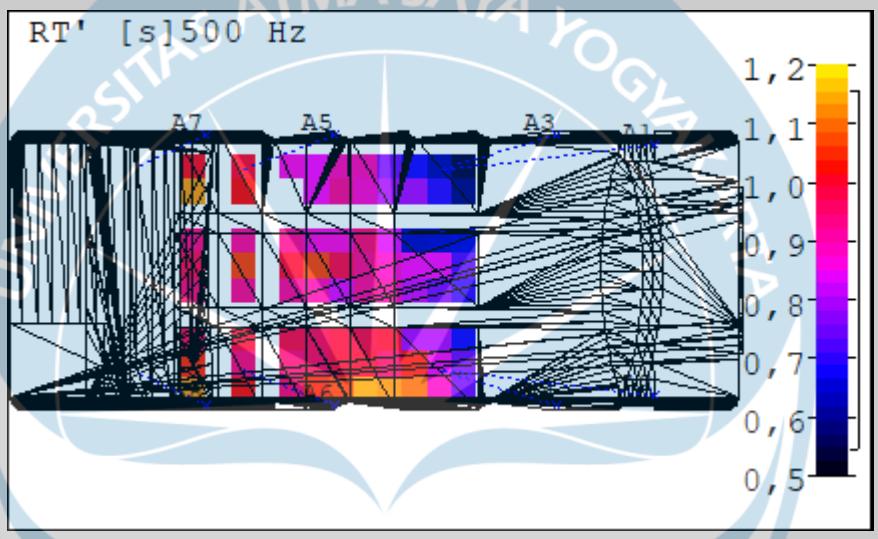
Tabel 30 Hasil Simulasi dengan CATT-Acoustic Sebelum Optimalisasi

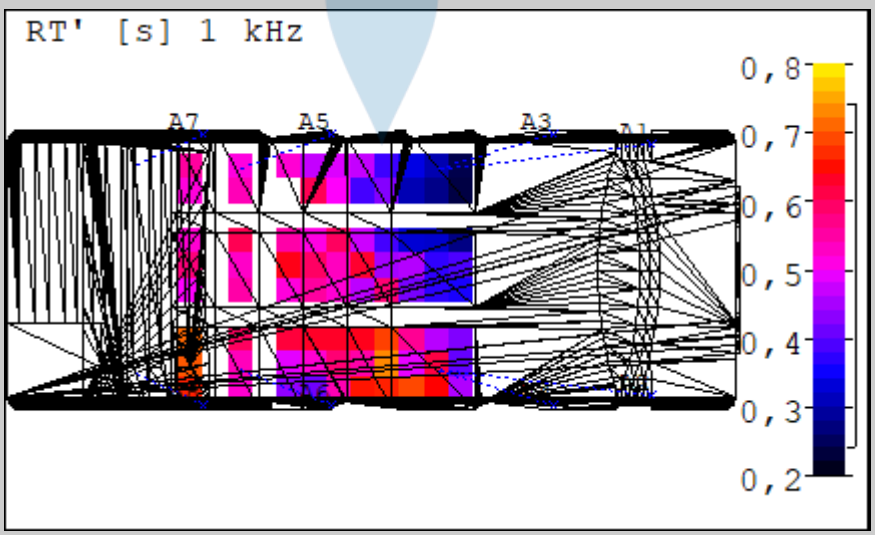
Hasil Simulasi Akustik 3D Model Hasil Optimalisasi

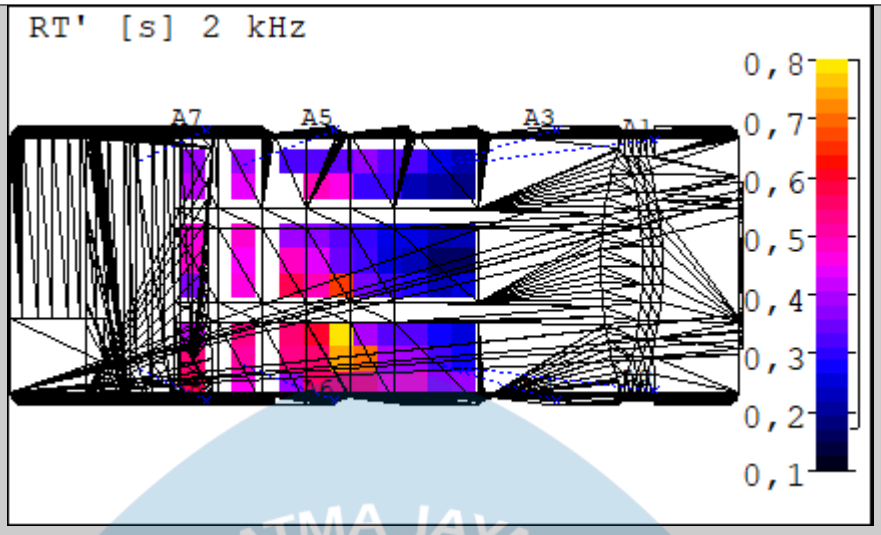
1. Reverberation Tima (RT60)

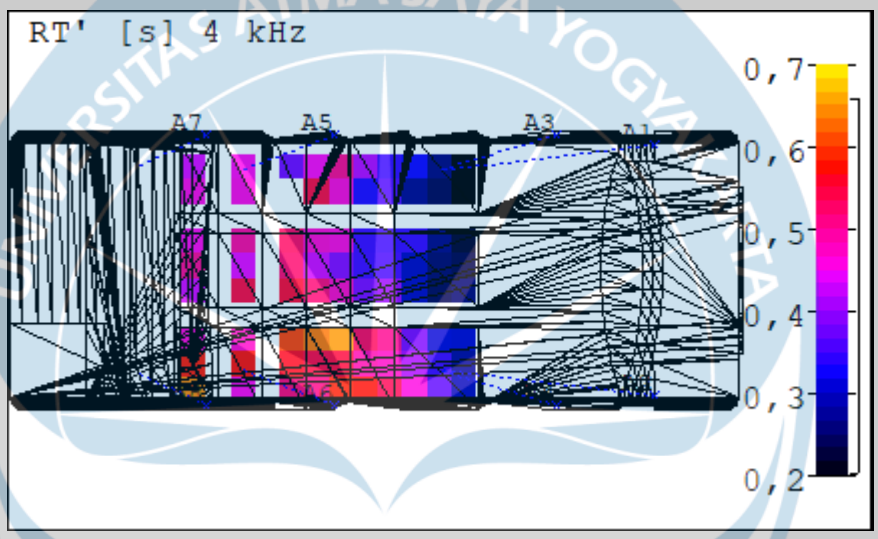


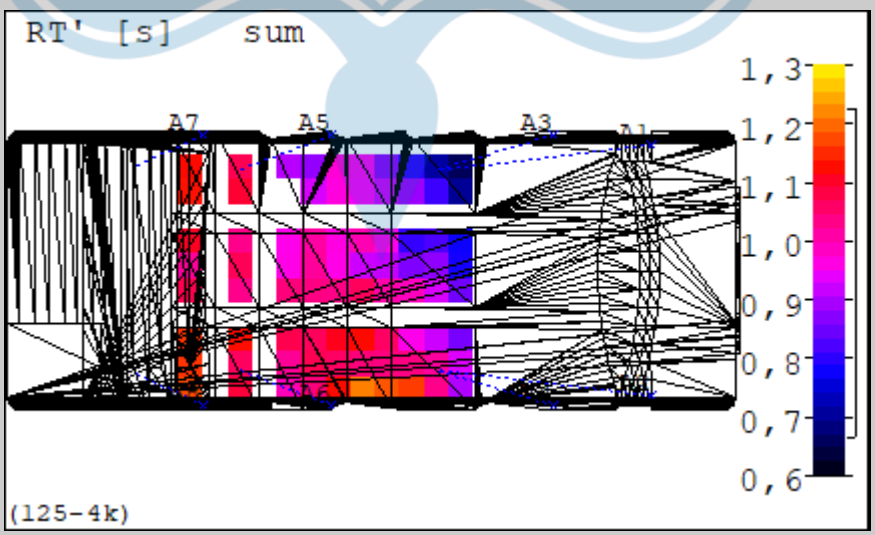

RT' [s]250 Hz
A7
A5
A3
1,5
1,4
1,3
1,2
1,1
1,0
0,9
0,8


RT' [s]500 Hz
A7
A5
A3
1,2
1,1
1,0
0,9
0,8
0,7
0,6
0,5

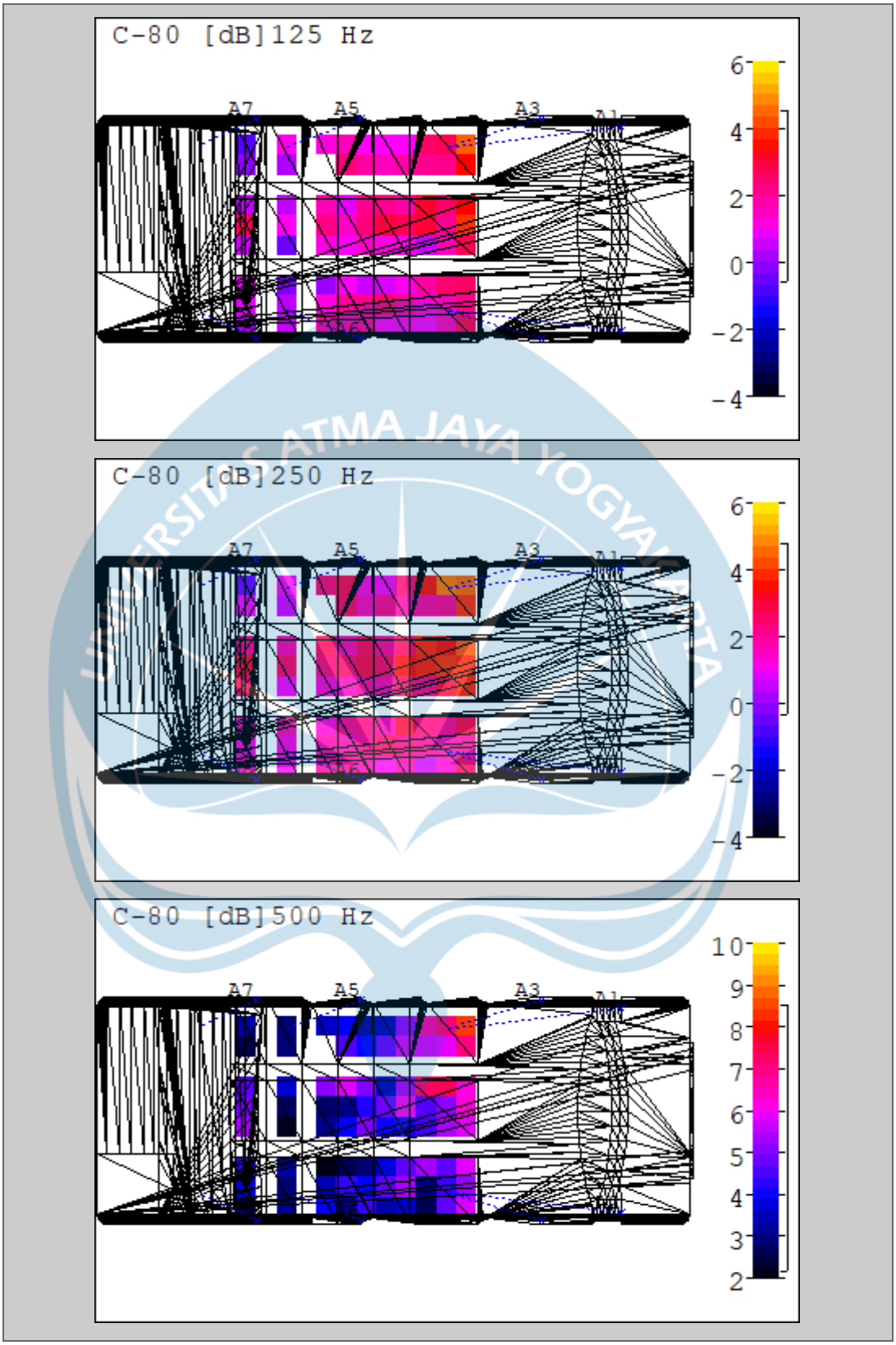

RT' [s] 1 kHz
A7
A5
A3
0,8
0,7
0,6
0,5
0,4
0,3
0,2

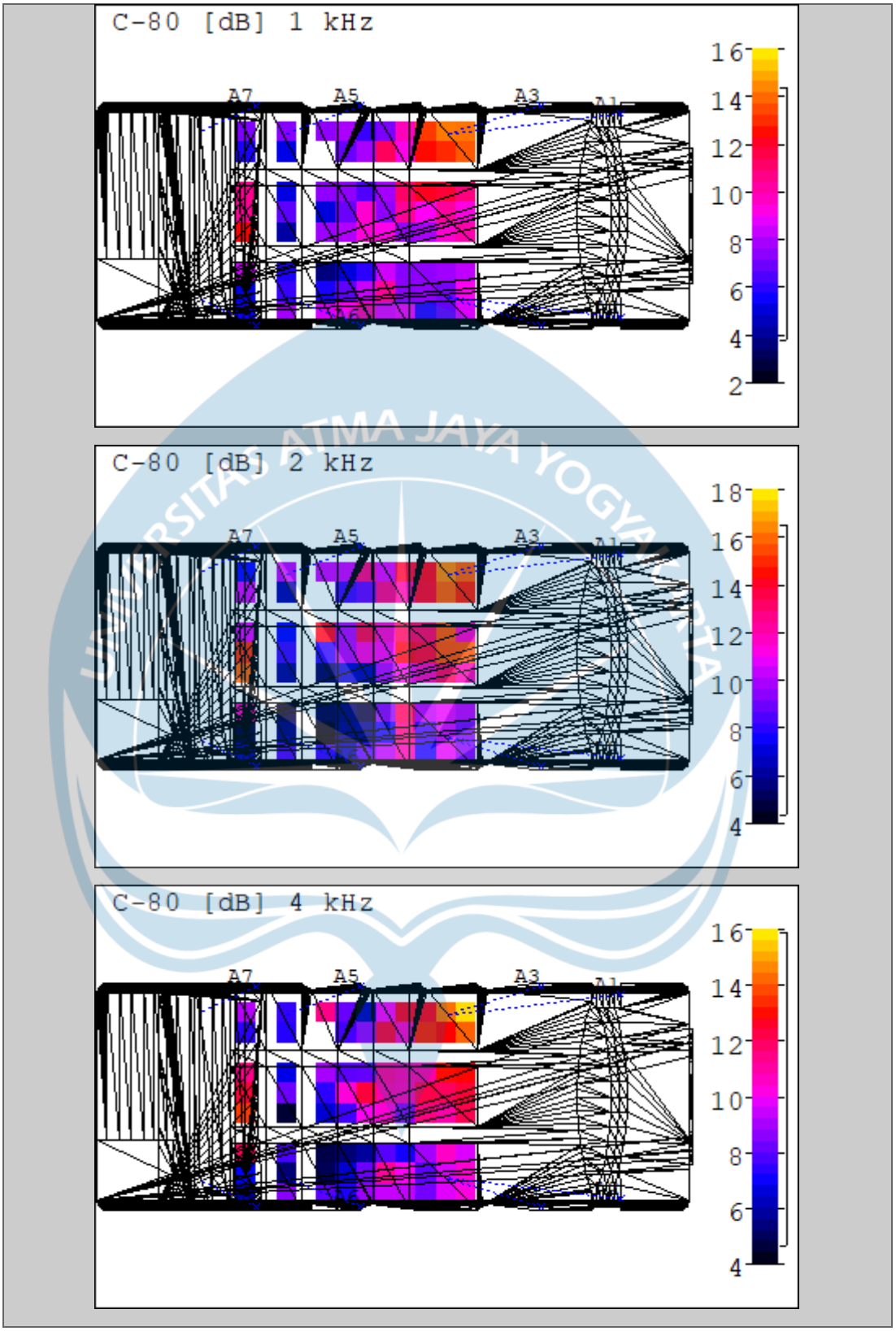


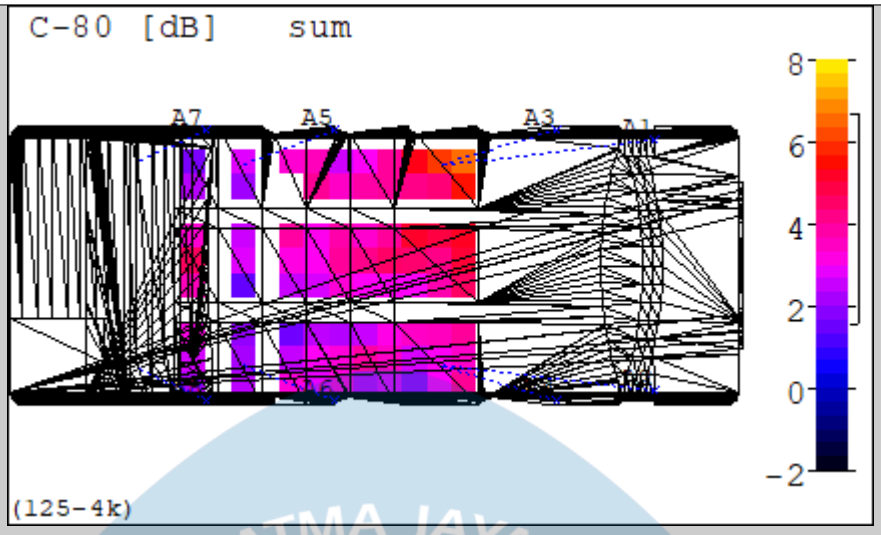




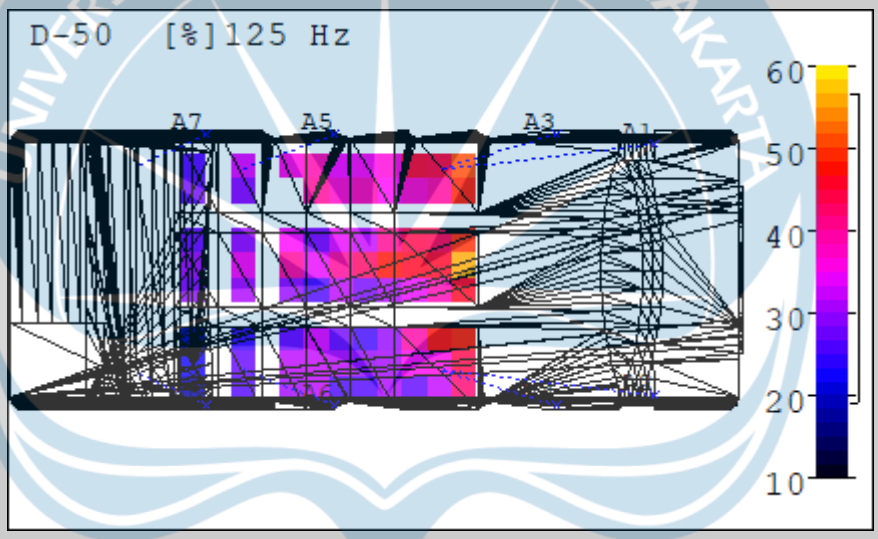
2. C80 - Clarity (dB)

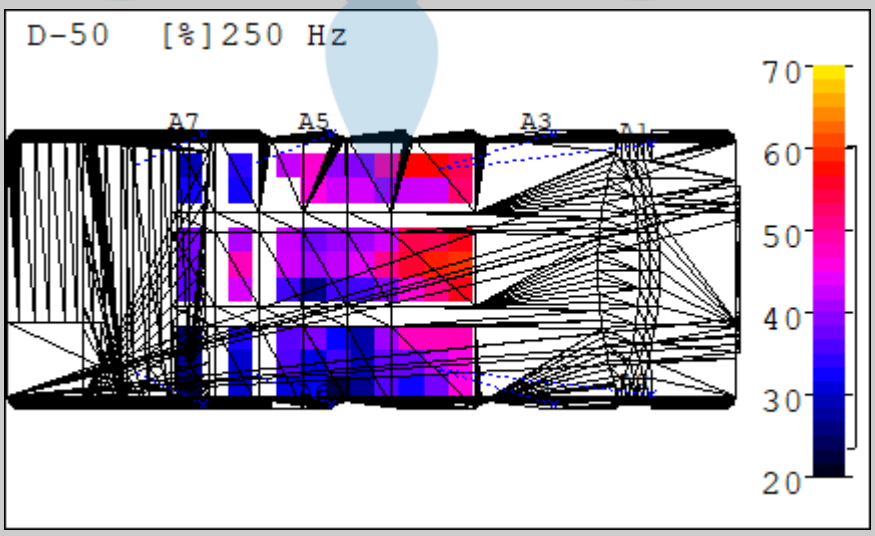

C-80 [dB]125 Hz
A7
A5
A3
6
4
2
0
-2
-4
C-80 [dB]250 Hz
A7
A5
A3
6
4
2
0
-2
-4
C-80 [dB]500 Hz
A7
A5
A3
10
9
8
7
6
5
4
3
2

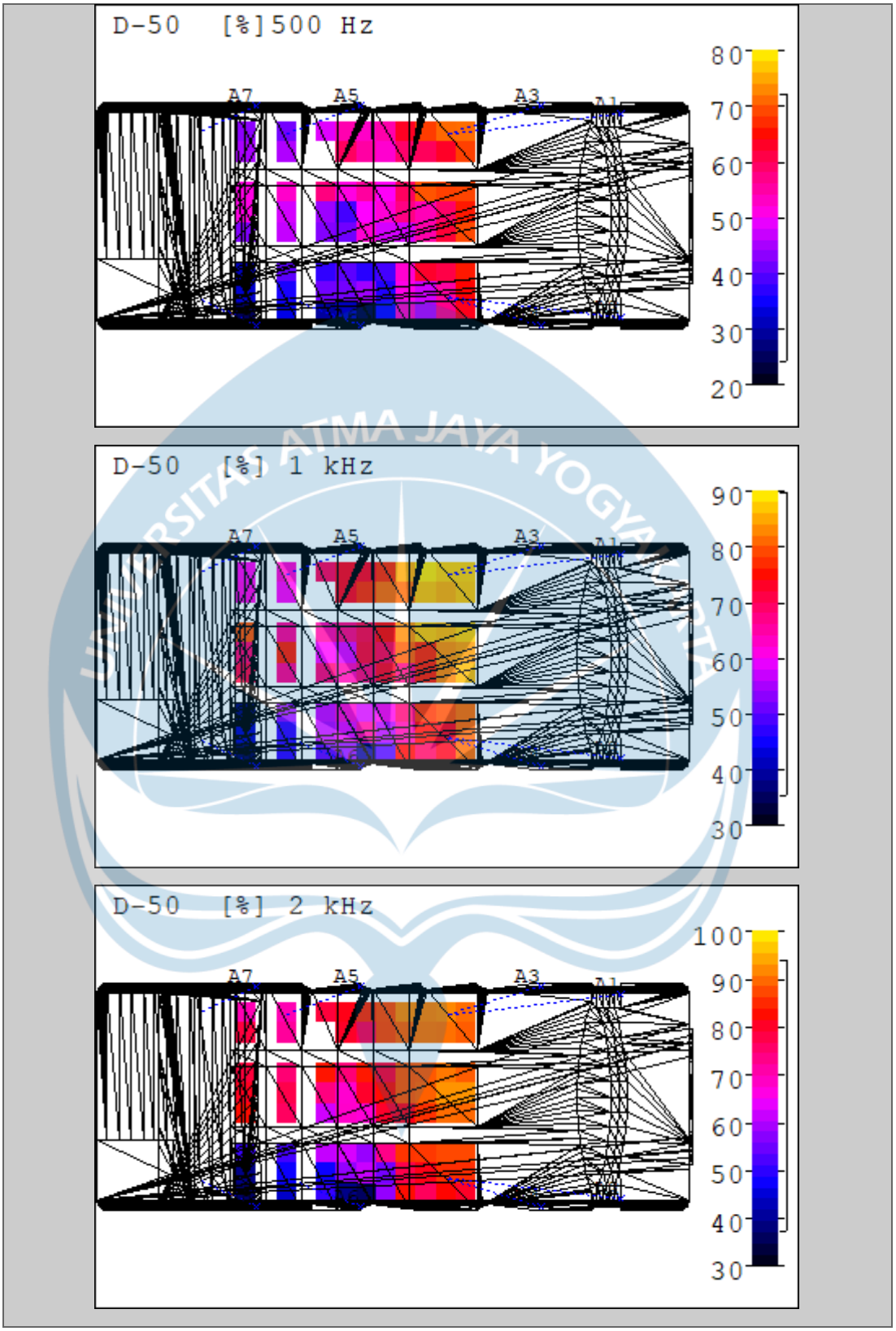

C-80 [dB] 1 kHz
A7
A5
A3
16
14
12
10
8
6
4
2
C-80 [dB] 2 kHz
A7
A5
A3
18
16
14
12
10
8
6
4
C-80 [dB] 4 kHz
A7
A5
A3
16
14
12
10
8
6
4

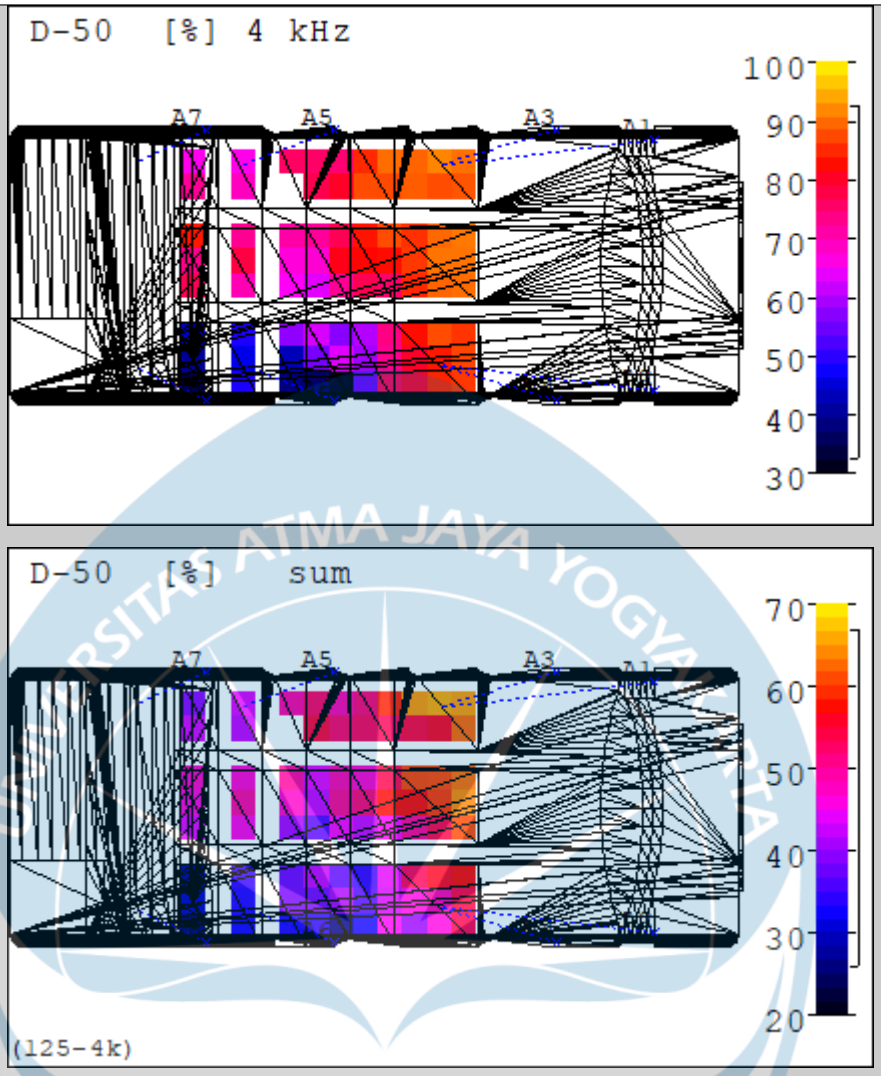


3. **D50 - Definition (%)**

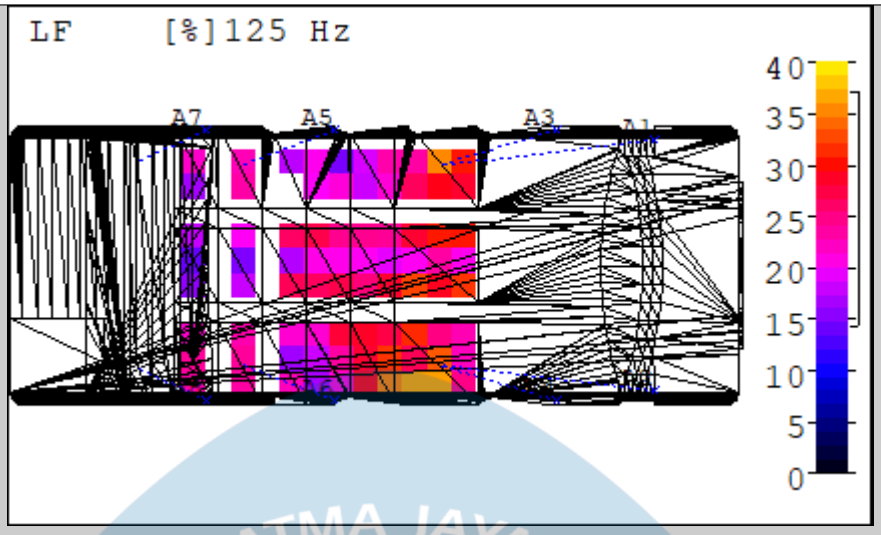


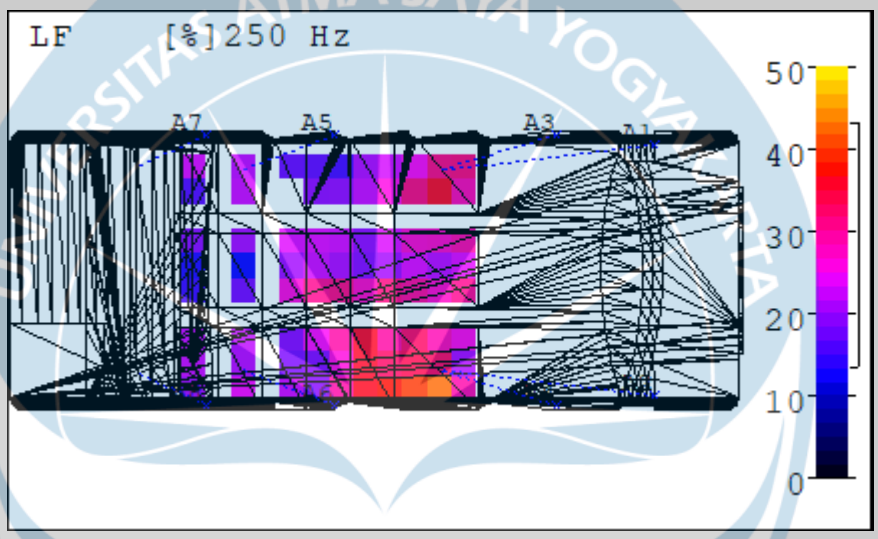


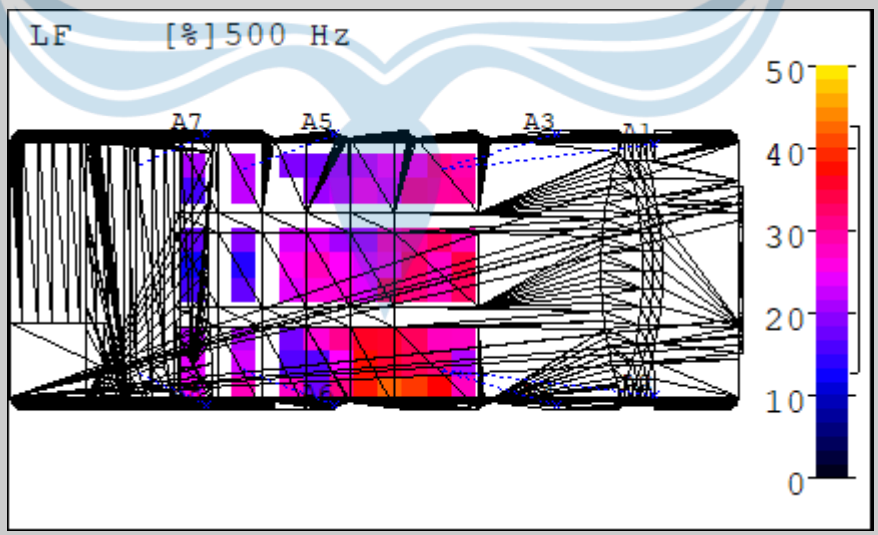

D-50 [%]500 Hz
A7
A5
A3
A1
80
70
60
50
40
30
20
D-50 [%] 1 kHz
A7
A5
A3
A1
90
80
70
60
50
40
30
D-50 [%] 2 kHz
A7
A5
A3
A1
100
90
80
70
60
50
40
30

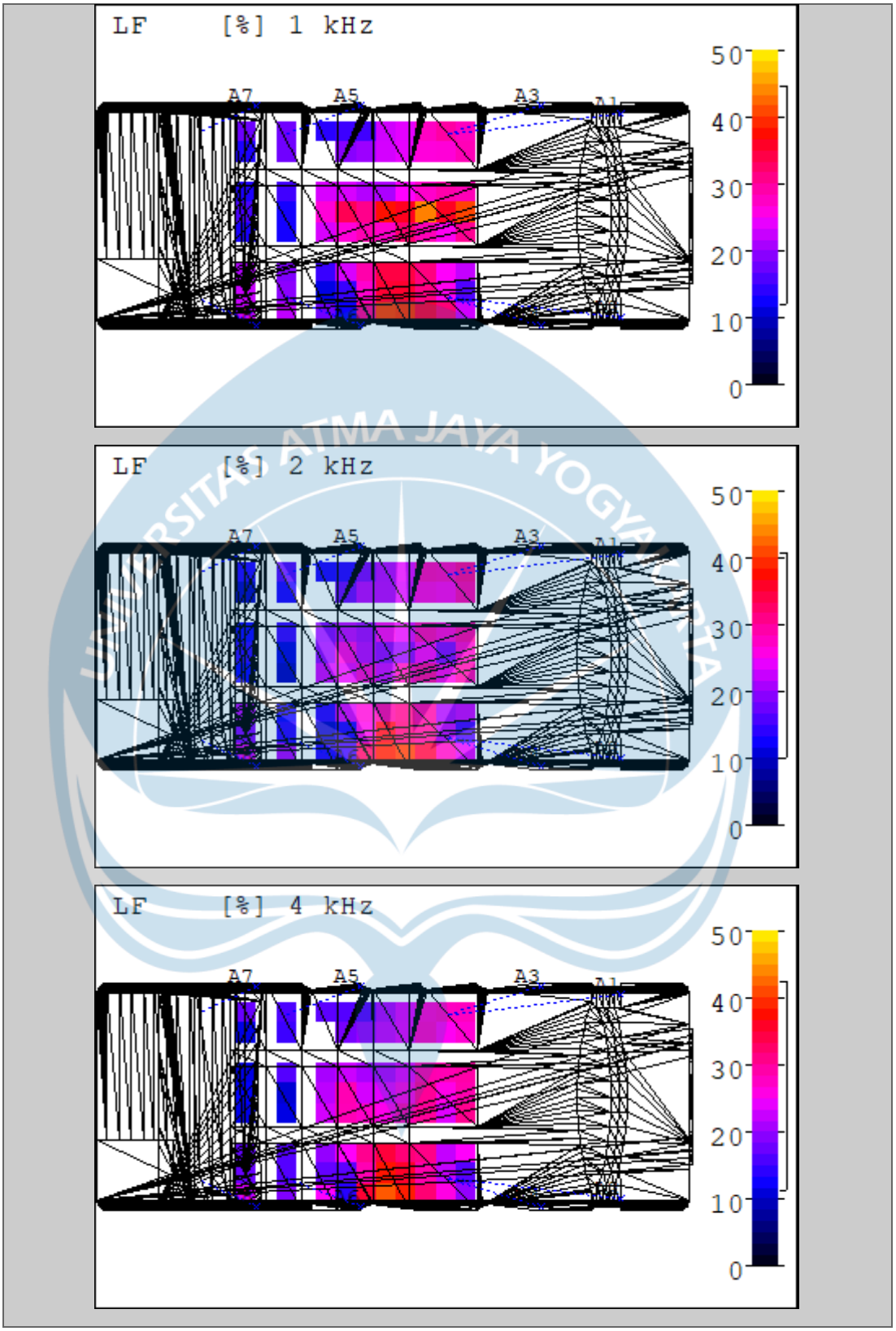


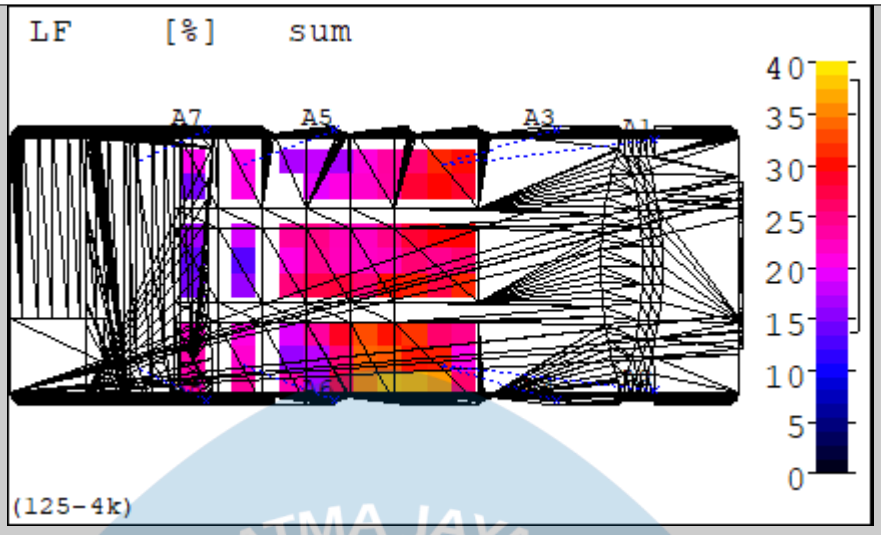
4. LF – Lateral Fraction (%)


LF [%]125 Hz
A7
A5
A3
A1
40
35
30
25
20
15
10
5
0

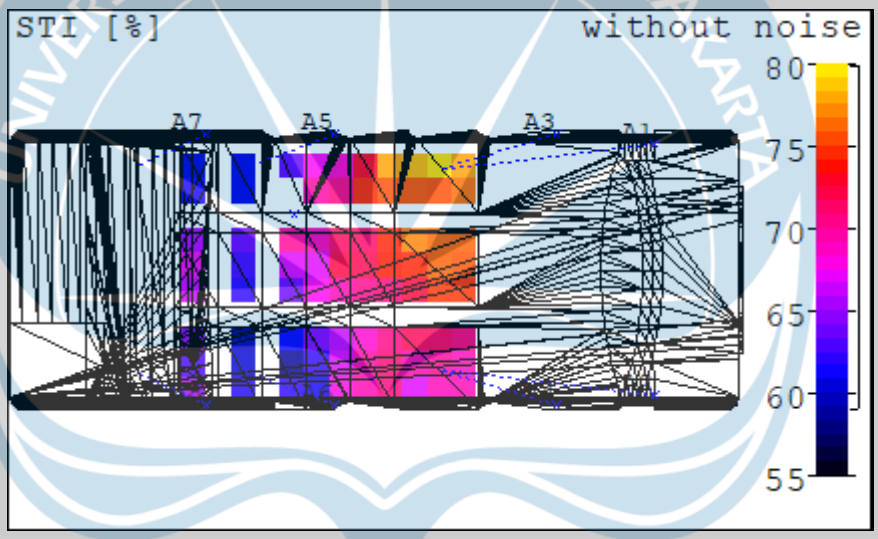

LF [%]250 Hz
A7
A5
A3
A1
50
40
30
20
10
0

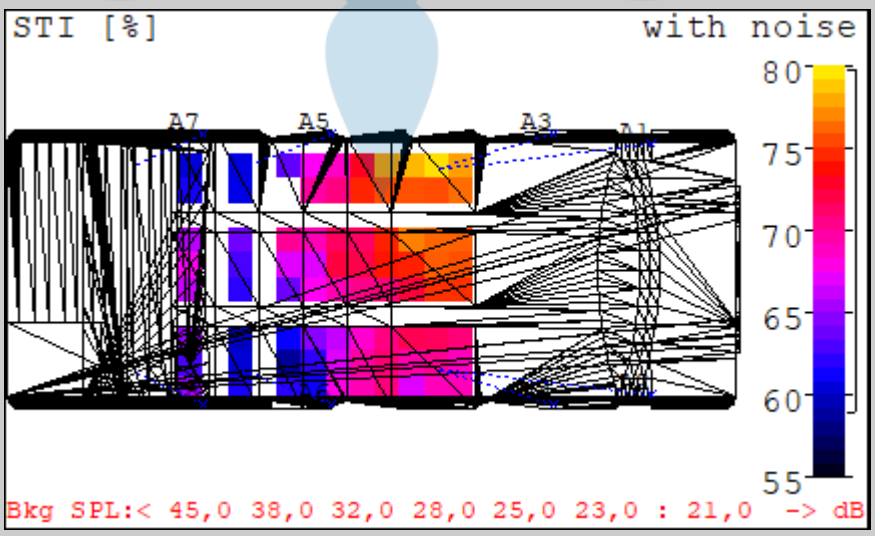

LF [%]500 Hz
A7
A5
A3
A1
50
40
30
20
10
0

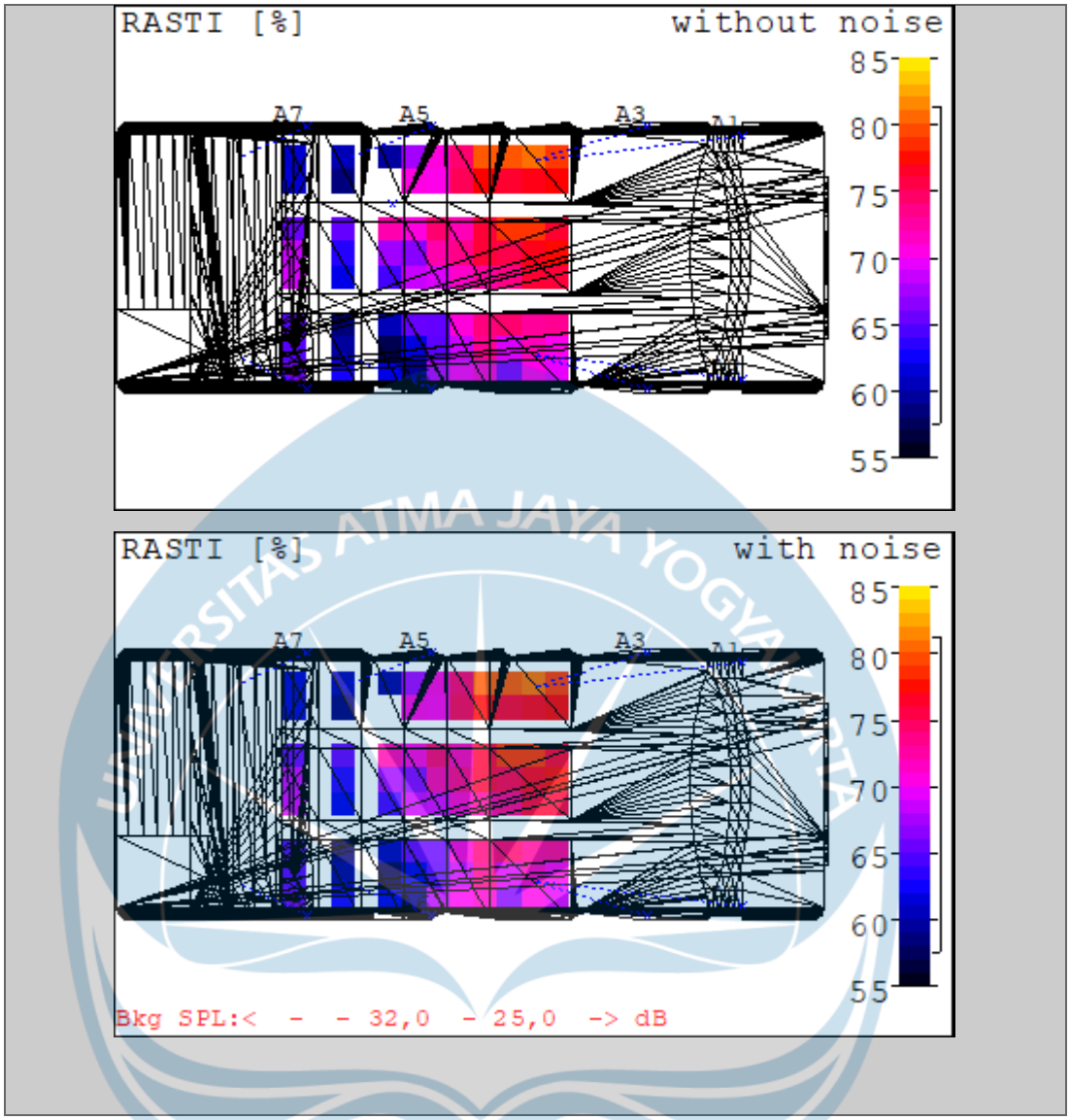

LF [%] 1 kHz
A7
A5
A3
50
40
30
20
10
0
LF [%] 2 kHz
A7
A5
A3
50
40
30
20
10
0
LF [%] 4 kHz
A7
A5
A3
50
40
30
20
10
0



5. **Sound Transmission Index (STI)**







Tabel 31 Hasil Simulasi CATT-Acoustic Sebelum Optimalisasi

Tabel 32 Hasil Simulasi dengan CATT-Acoustic Setelah Optimalisasi

Dokumentasi Pengukuran Gelombang otak Subjek dengan EPOC Emotiv


Tabel 33 Pengukuran Powerband Subjek dengan EPOC Emotiv

Tampilan Software Emotiv selama pengukuran


Tabel 34 Gambar Tampilan Software Emotiv selama pengukuran

Data Hasil Pengukuran Gelombang Otak
https://drive.google.com/drive/folders/1ojCpp_IK9TI5GcoE4W7kfuShdg22CjTP?usp=sharing **Link di atas berisi data powerband lengkap tiap Responden, disemua genre lagu, baik sebelum (E), maupun sesudah optimalisasi (O)**

Tabel 35 Link Data Hasil Pengukuran Gelombang Otak Semua Subjek