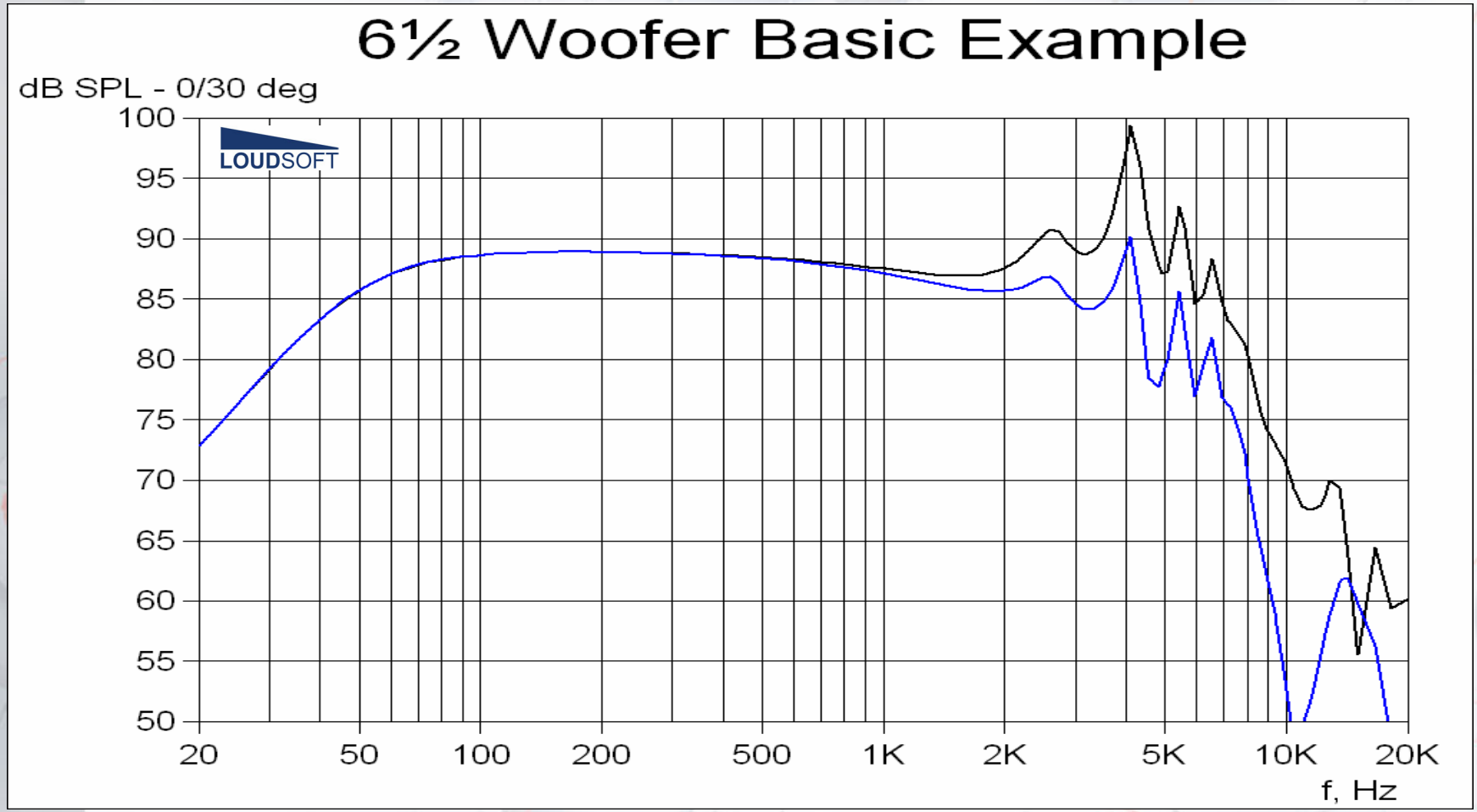
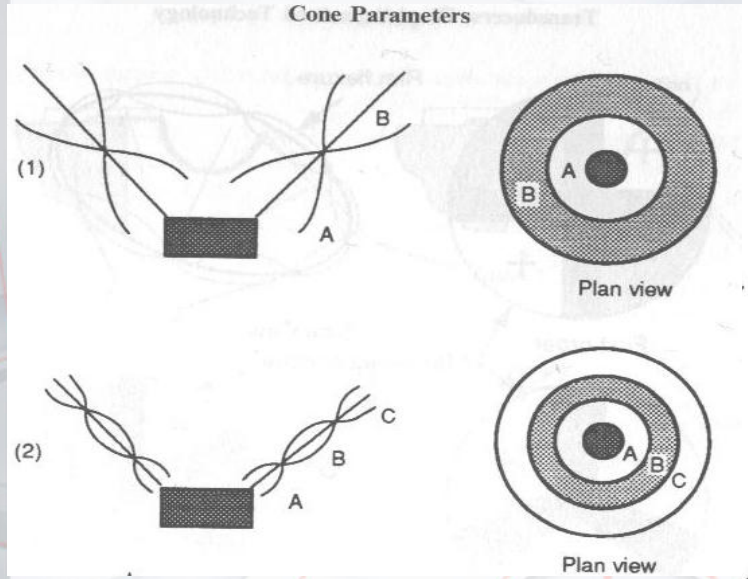
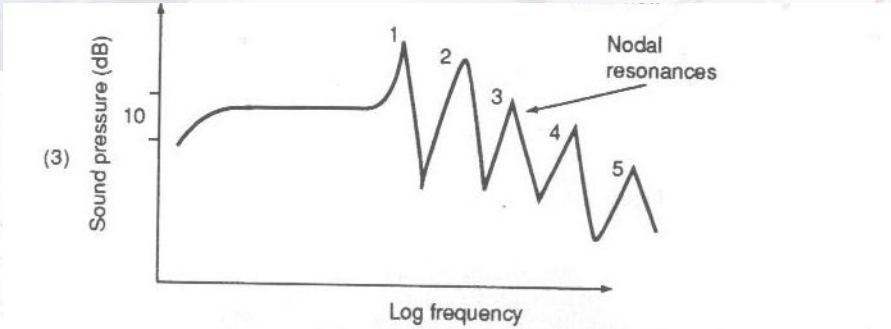
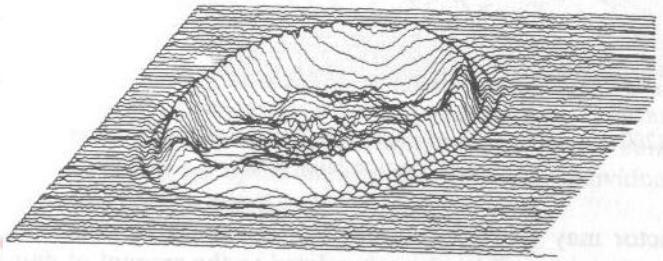

6½ Woofer Basic Example
dB SPL - 0/30 deg
LOUDSOFT
100
95
90
85
80
75
70
65
60
55
50
20
50
100
200
500
1K
2K
5K
10K
20K
f, Hz

Basic Symmetric Cone Modes
Ref. M.Colloms



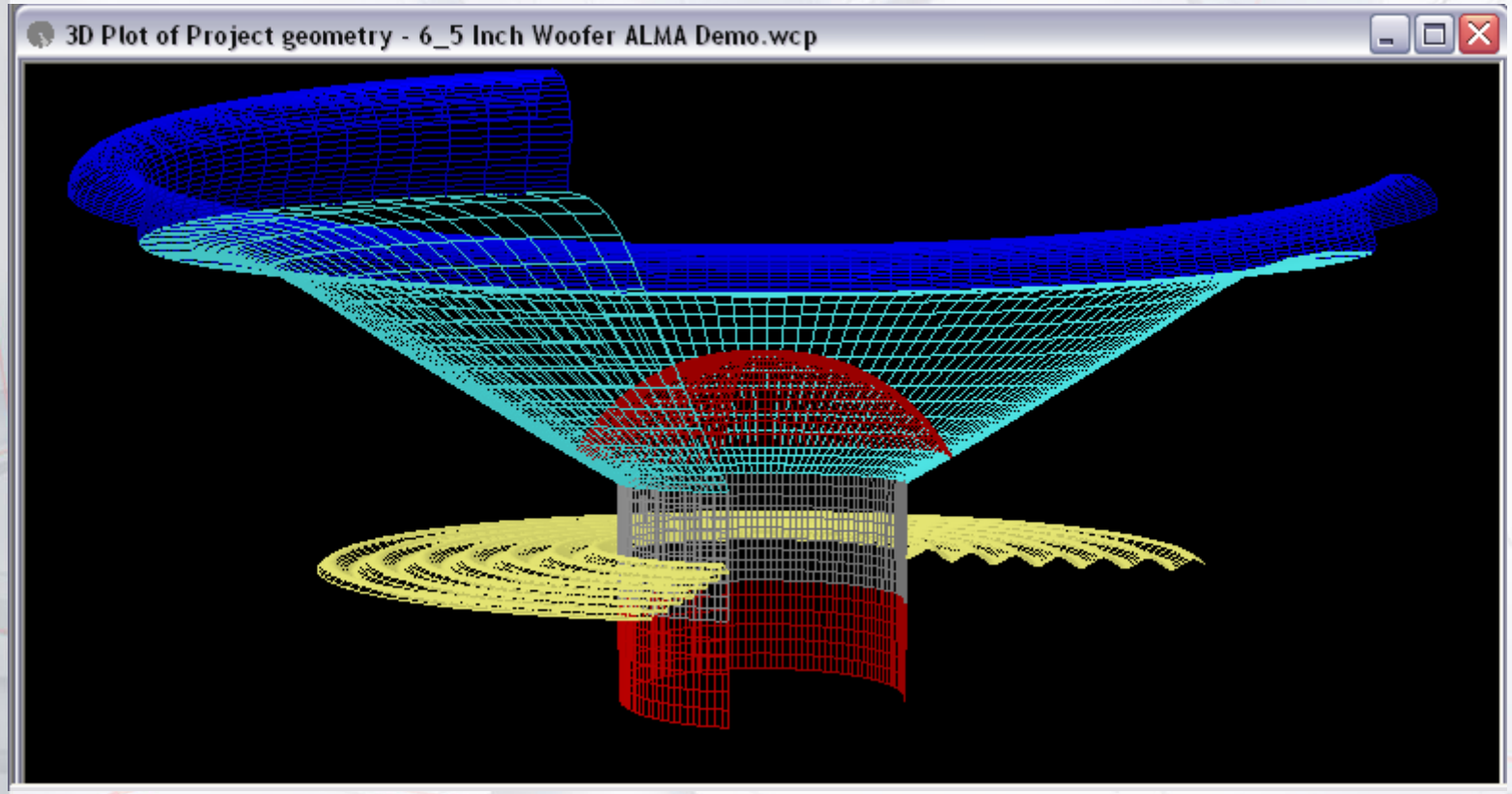


(a) Nodal resonances (concentric); (1) first nodal resonance, (2) second nodal resonance, (3) effect of nodal resonances on response

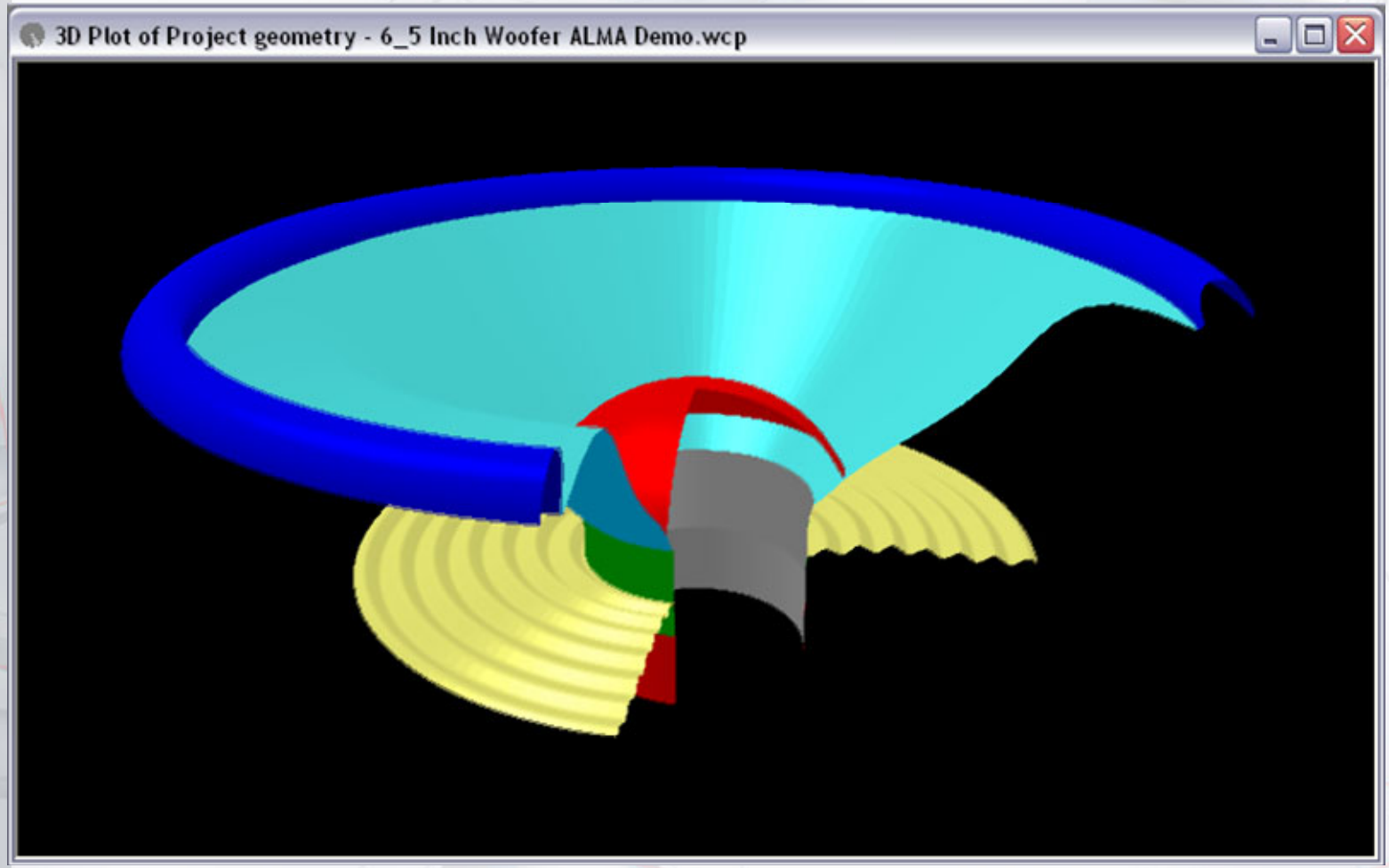


(b) 8 in (200 mm) curved paper cone, with surround, $f = 2.9$ kHz, bending resonance (nodal). (Celestion laser scan)

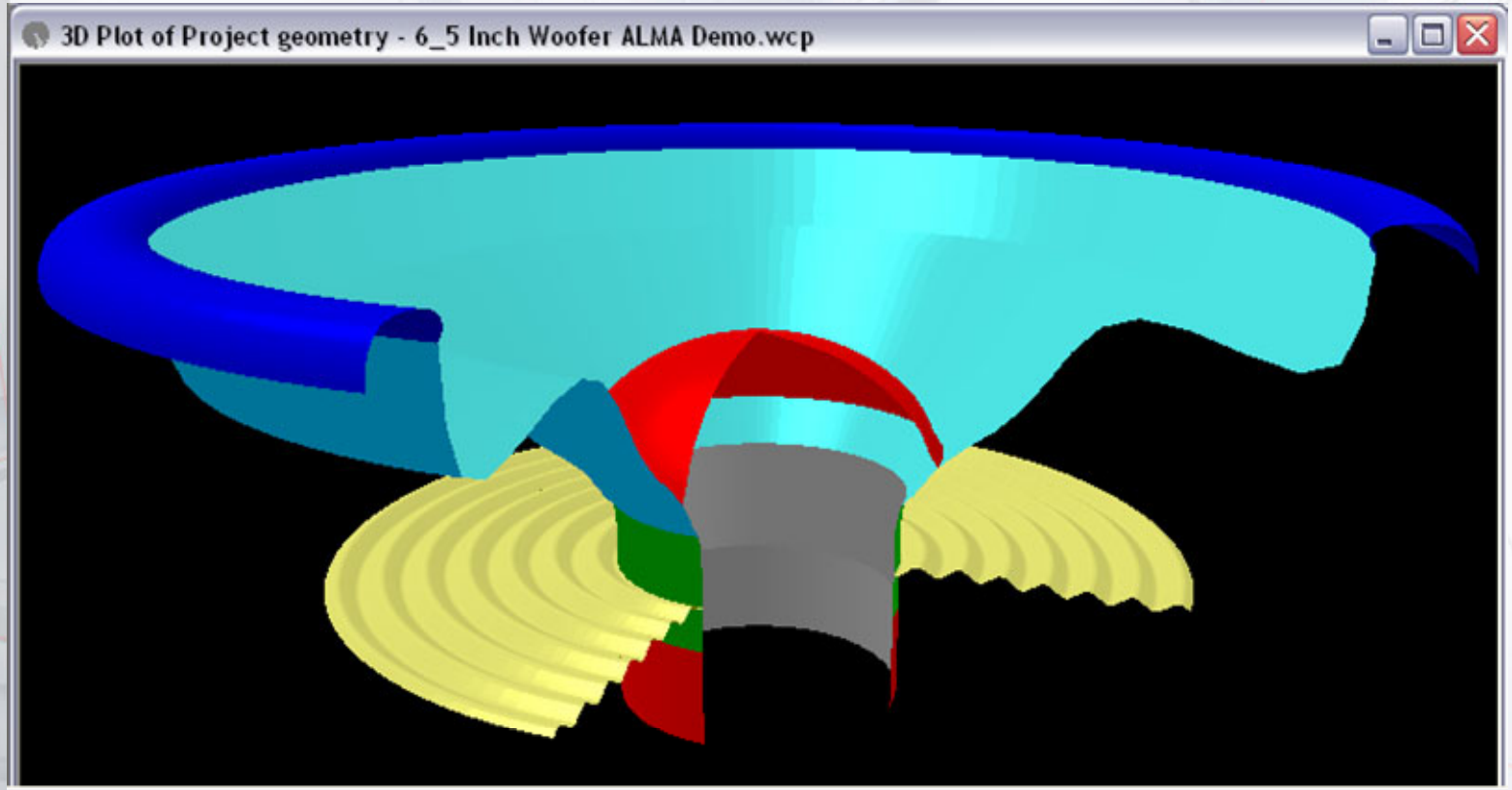
Lowest Mode:
Edge Bending @ 2589Hz



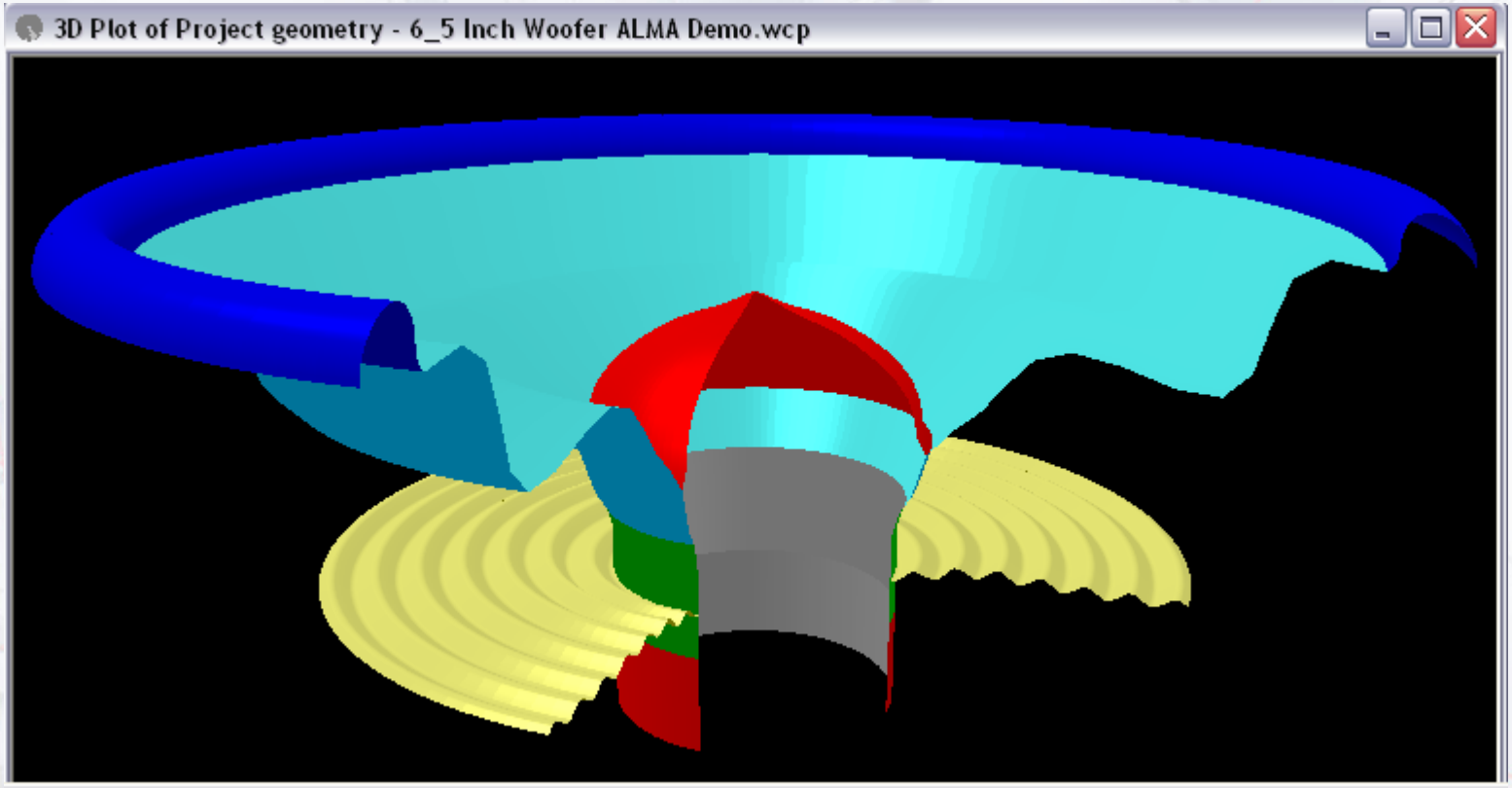
1st Cone Break-up Mode @ 4091Hz



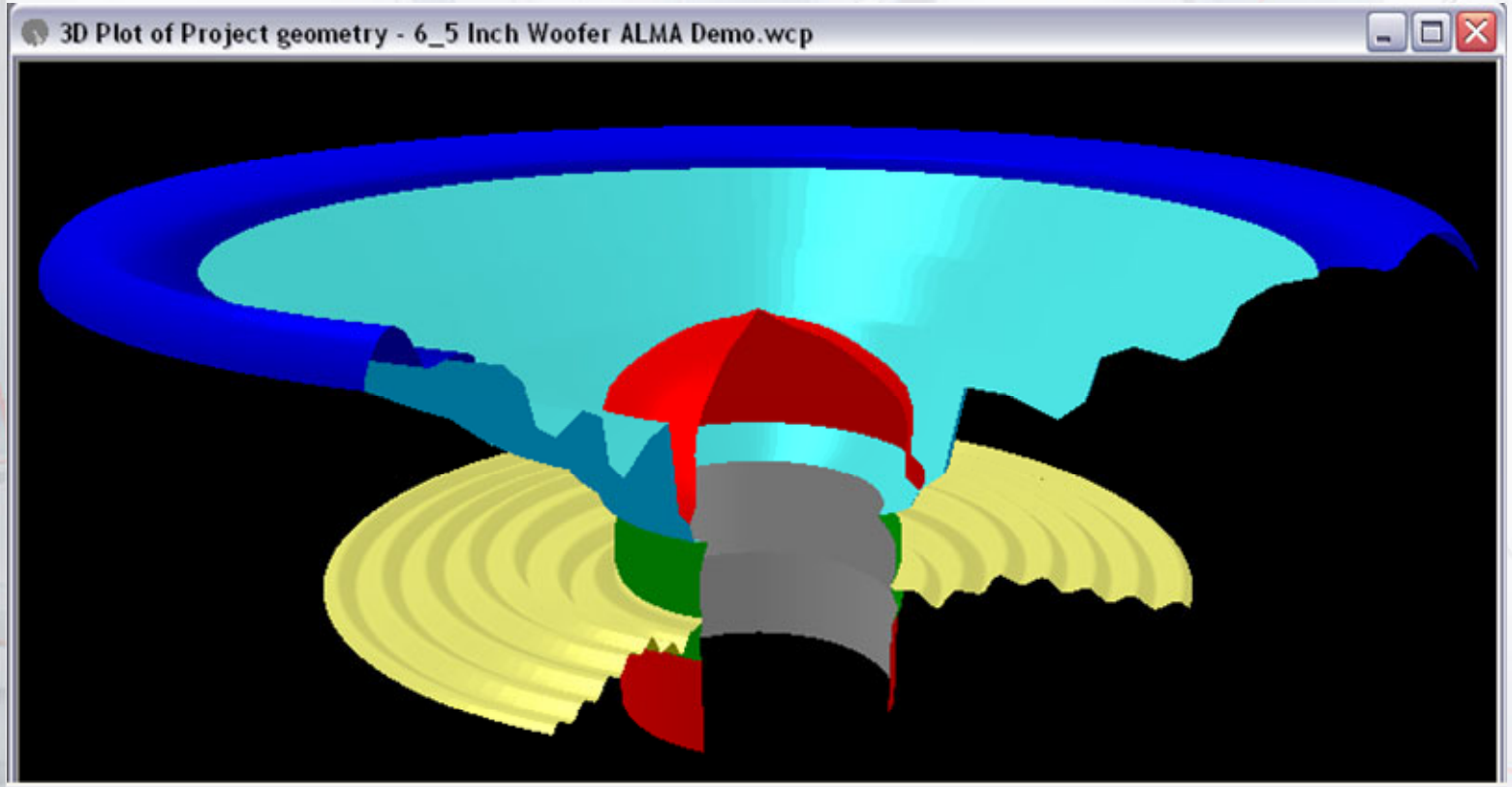
2nd Cone Break-up Mode @ 5413Hz



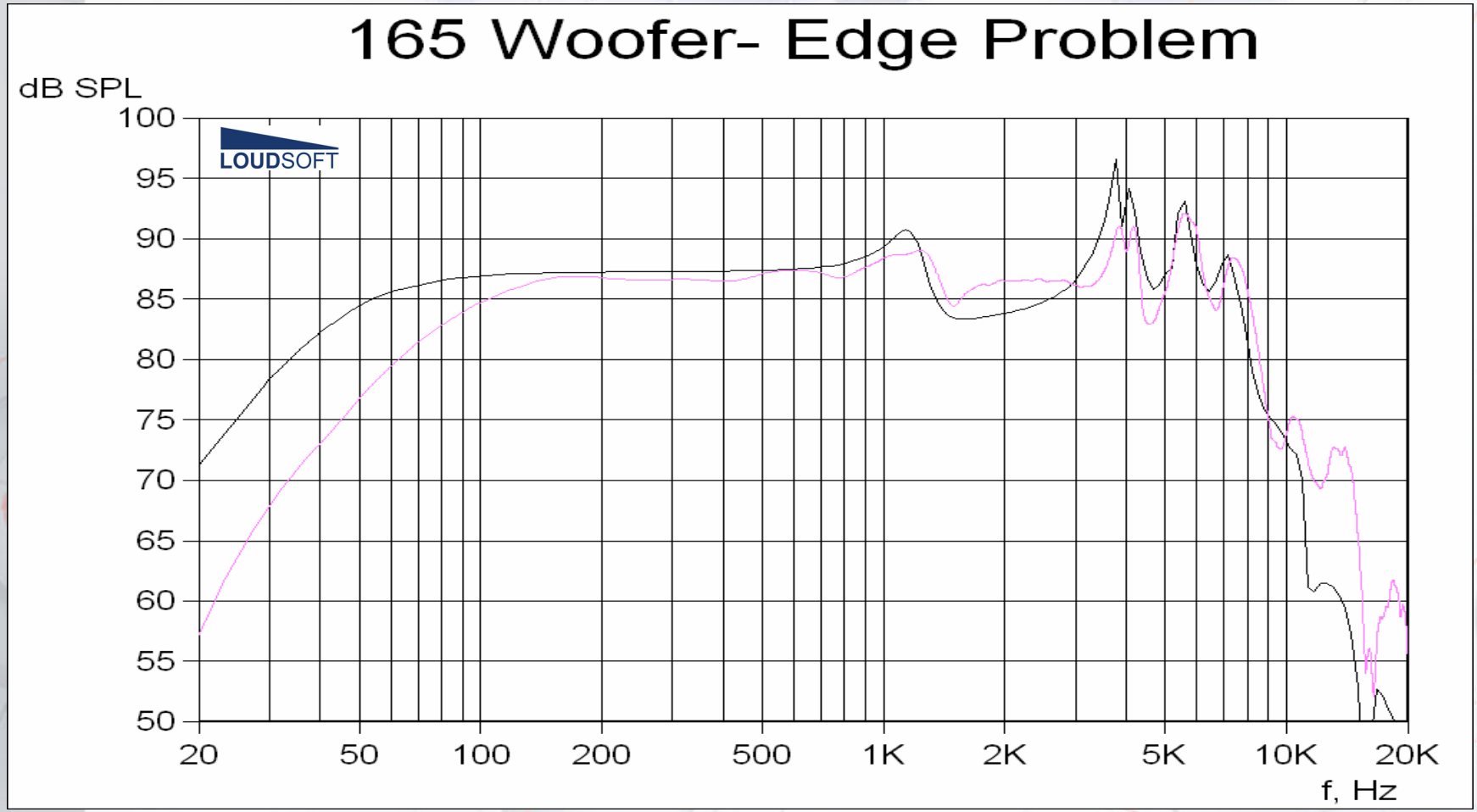
3rd Cone Break-up Mode @ 6524Hz
+ Dust cap break-up



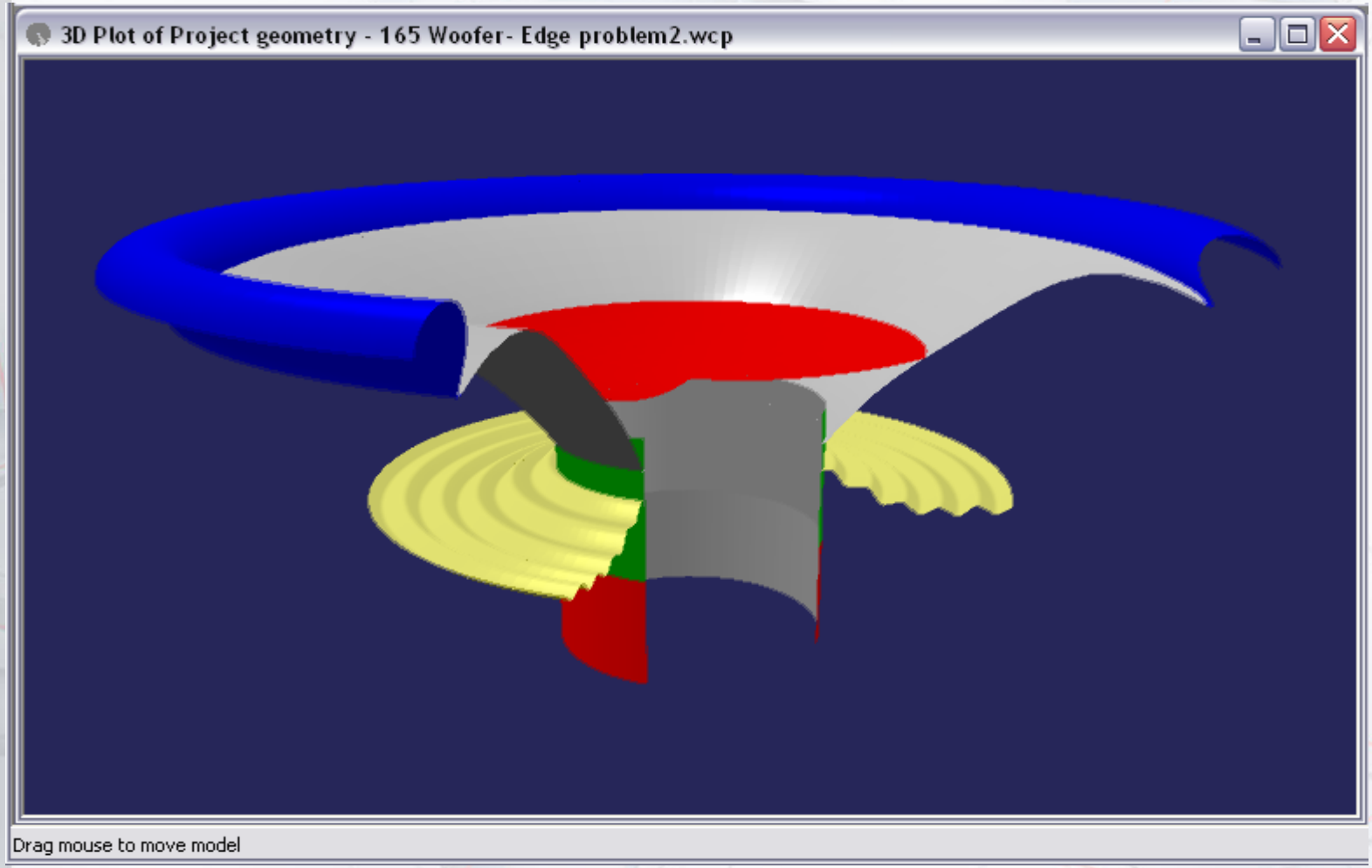
High order Cone Break-up Mode @ 12541Hz
Decaying amplitude
Voice coil former bending

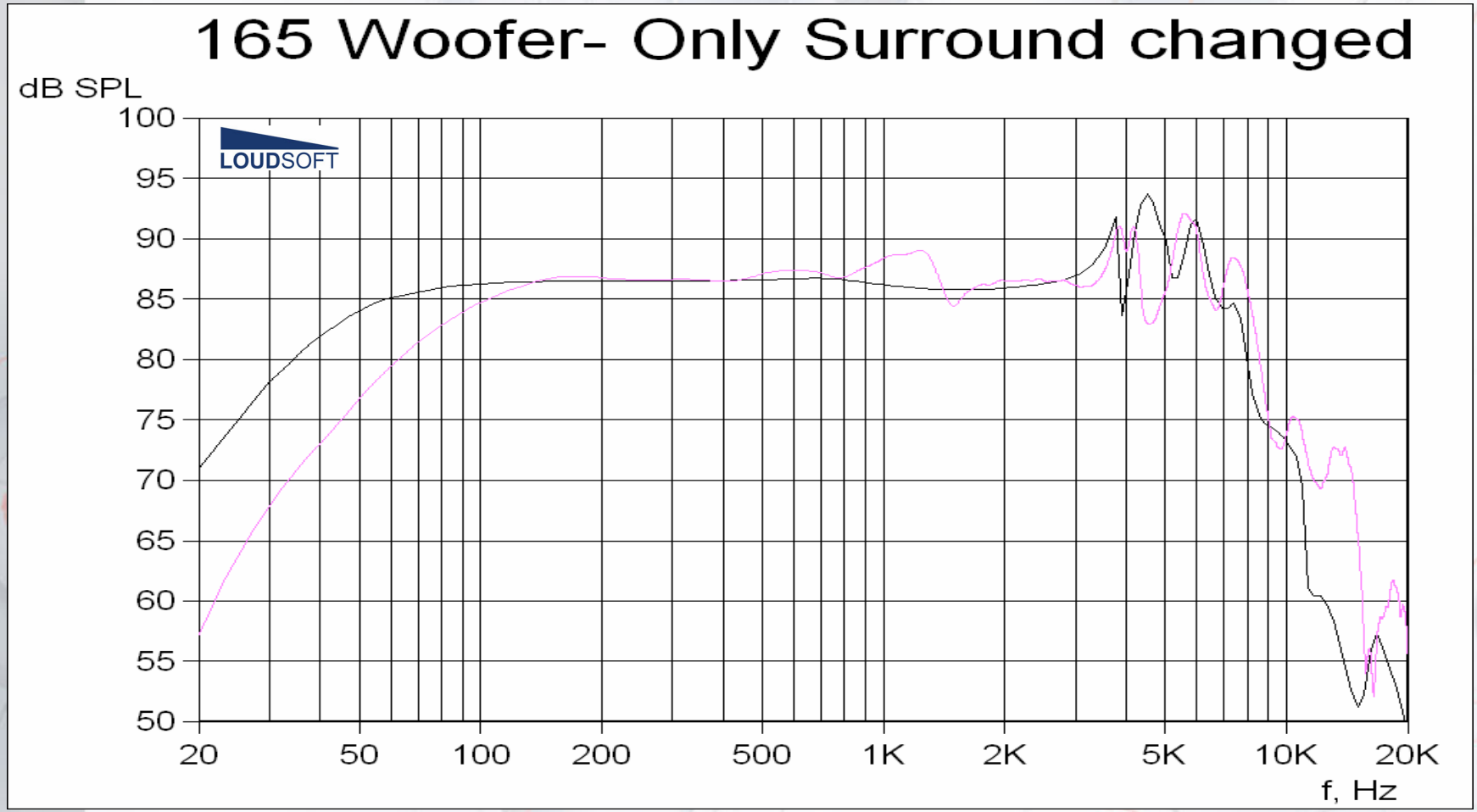


2D FEA Analysis of 165mm Woofer
Pink: Measured response
Black: Simulated

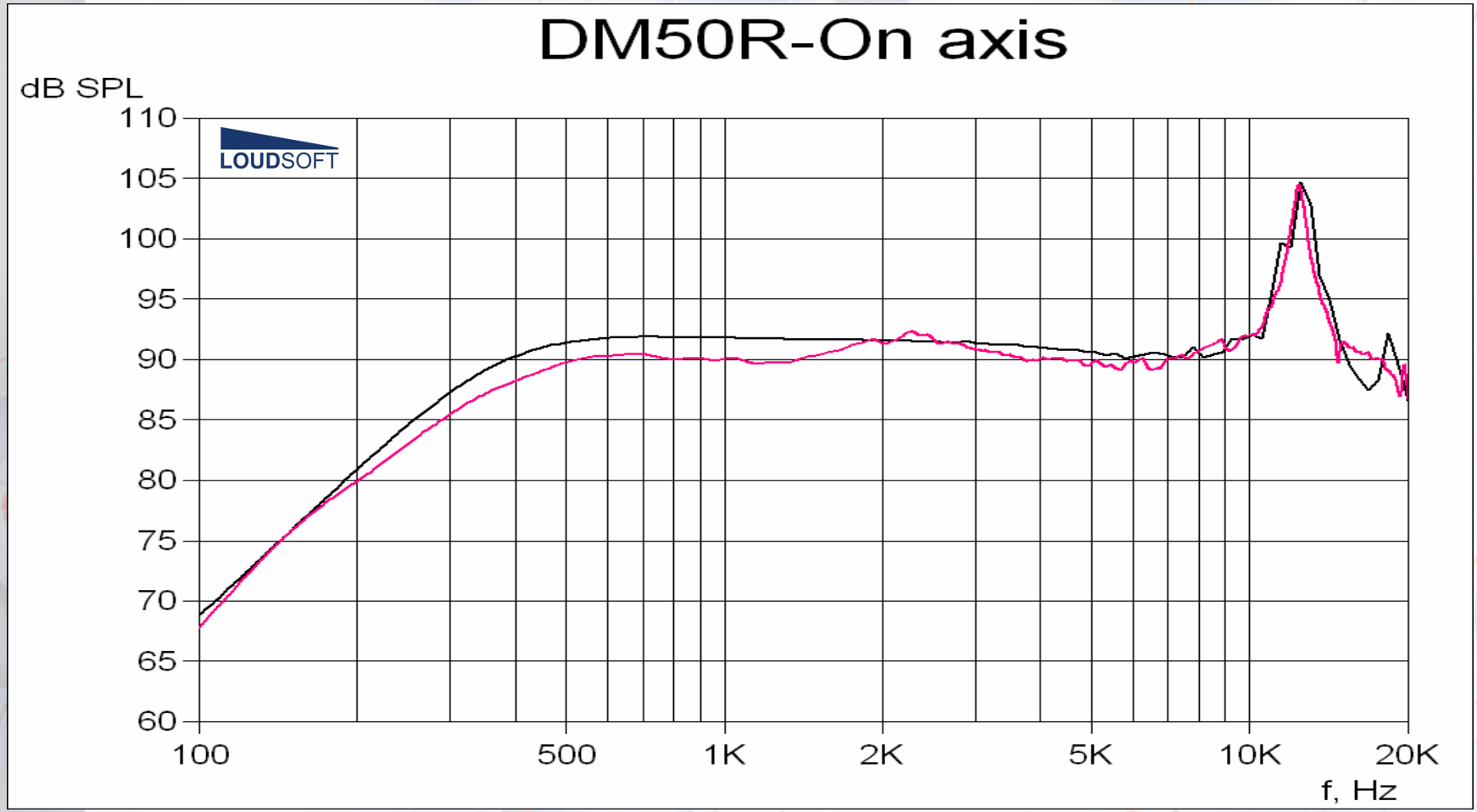


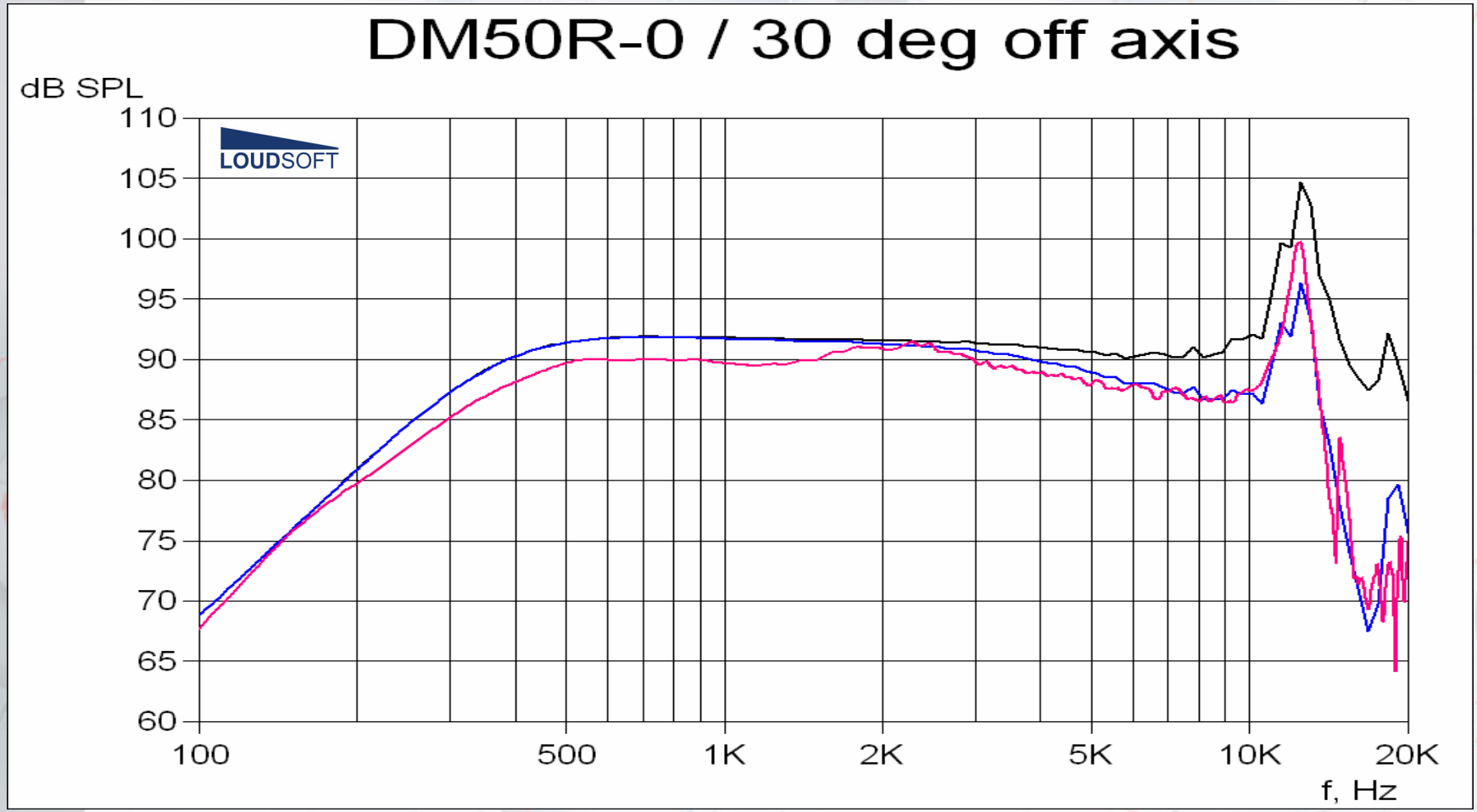
Cone Edge Break-up @ 1617Hz



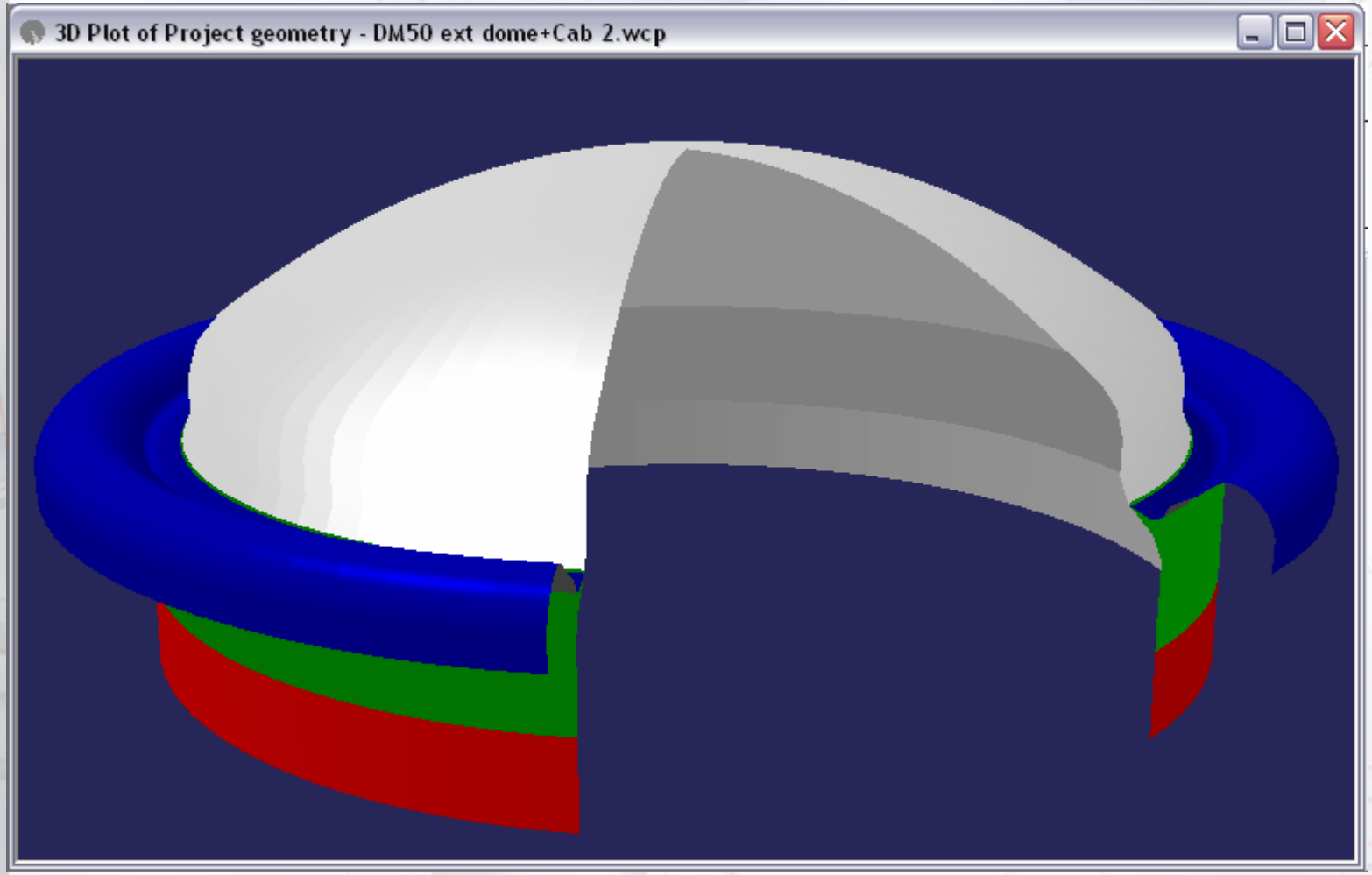

165 Woofer- Only Surround changed
dB SPL
100
95
90
85
80
75
70
65
60
55
50
LOUDSOFT
20
50
100
200
500
1K
2K
5K
10K
20K
f, Hz

2D FEA of 2 inch / 50mm Alu Dome
Rear cavity included
Pink = Measured

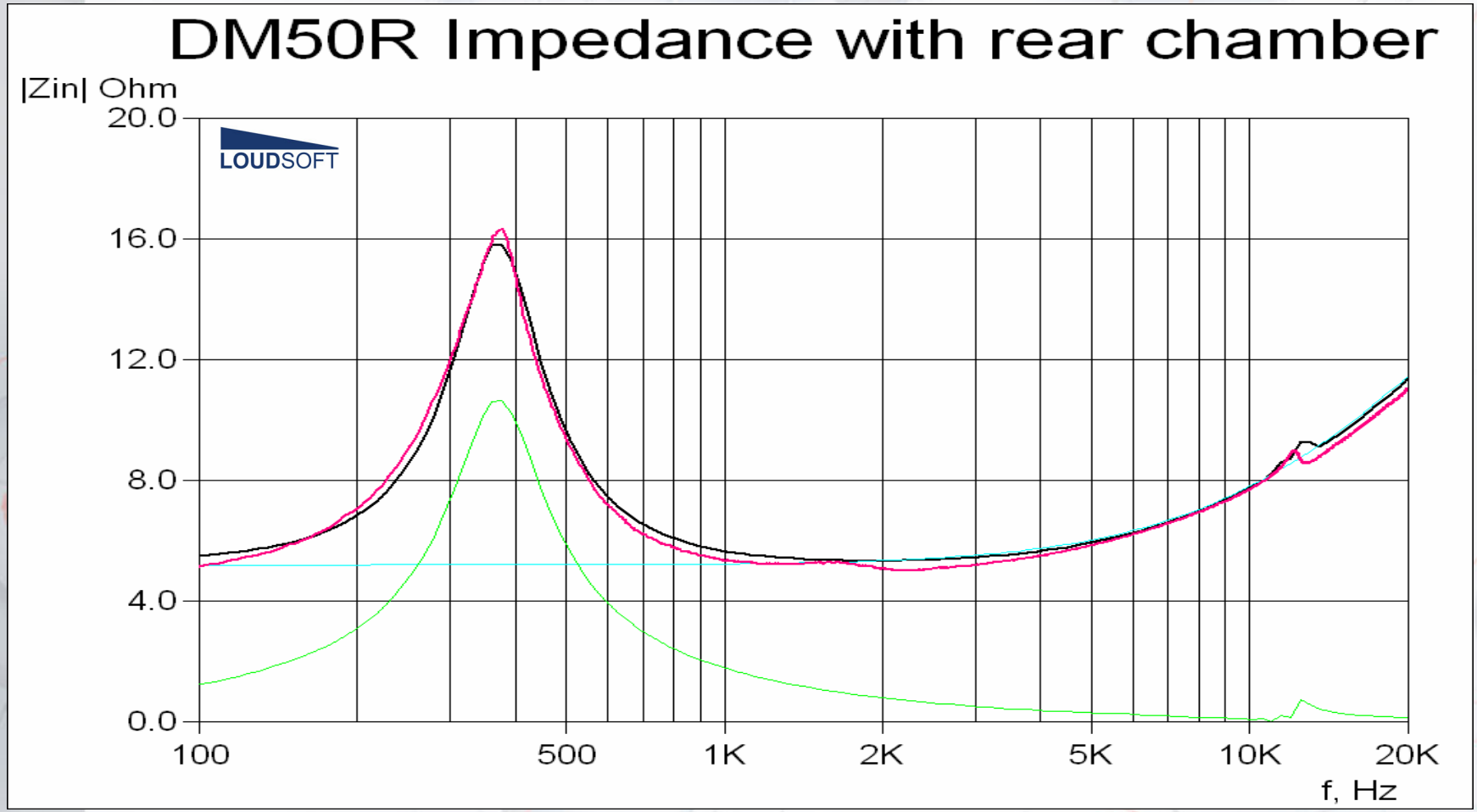


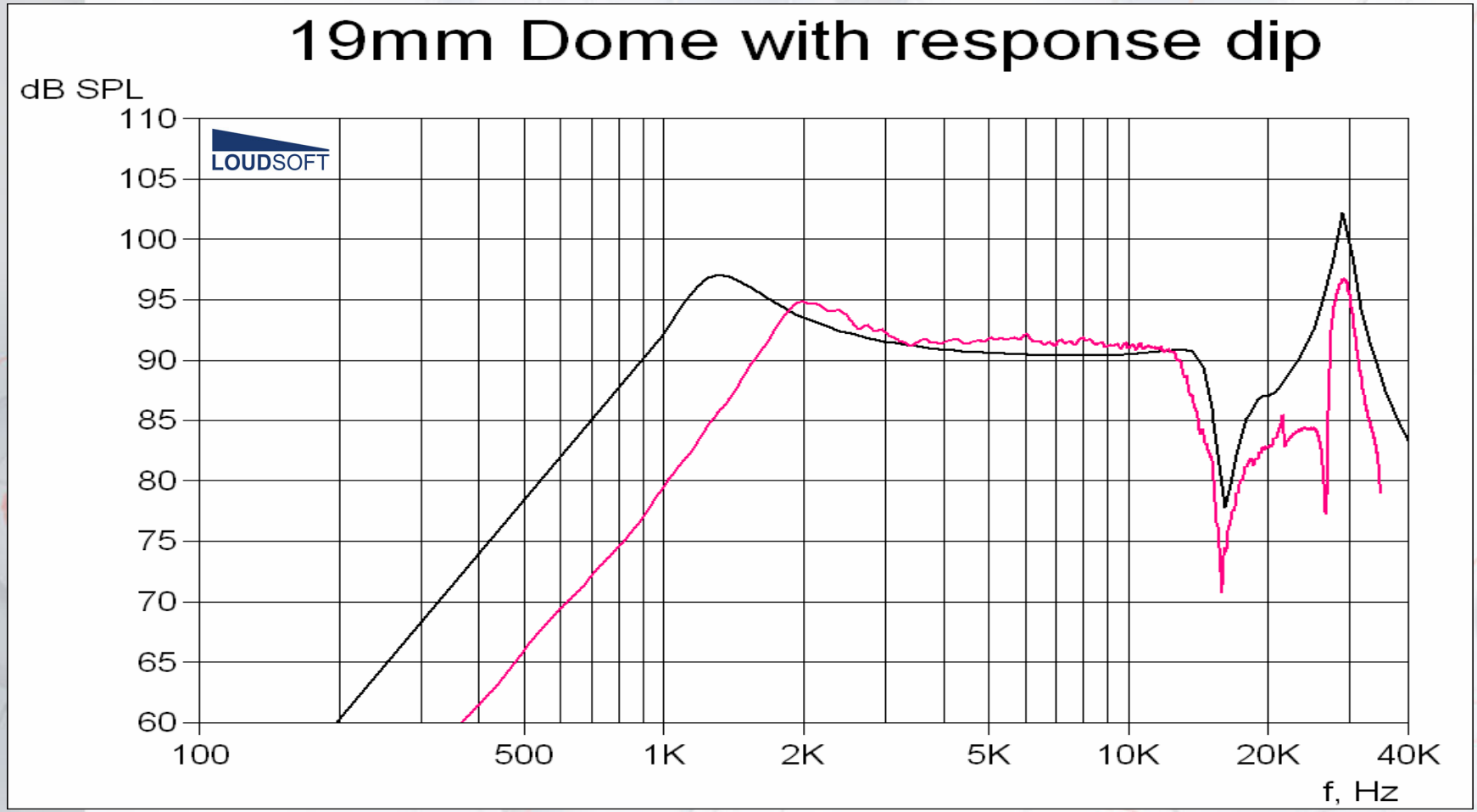

DM50R-0 / 30 deg off axis
dB SPL
110
105
100
95
90
85
80
75
70
65
60
LOUDSOFT
100
500
1K
2K
5K
10K
20K
f, Hz

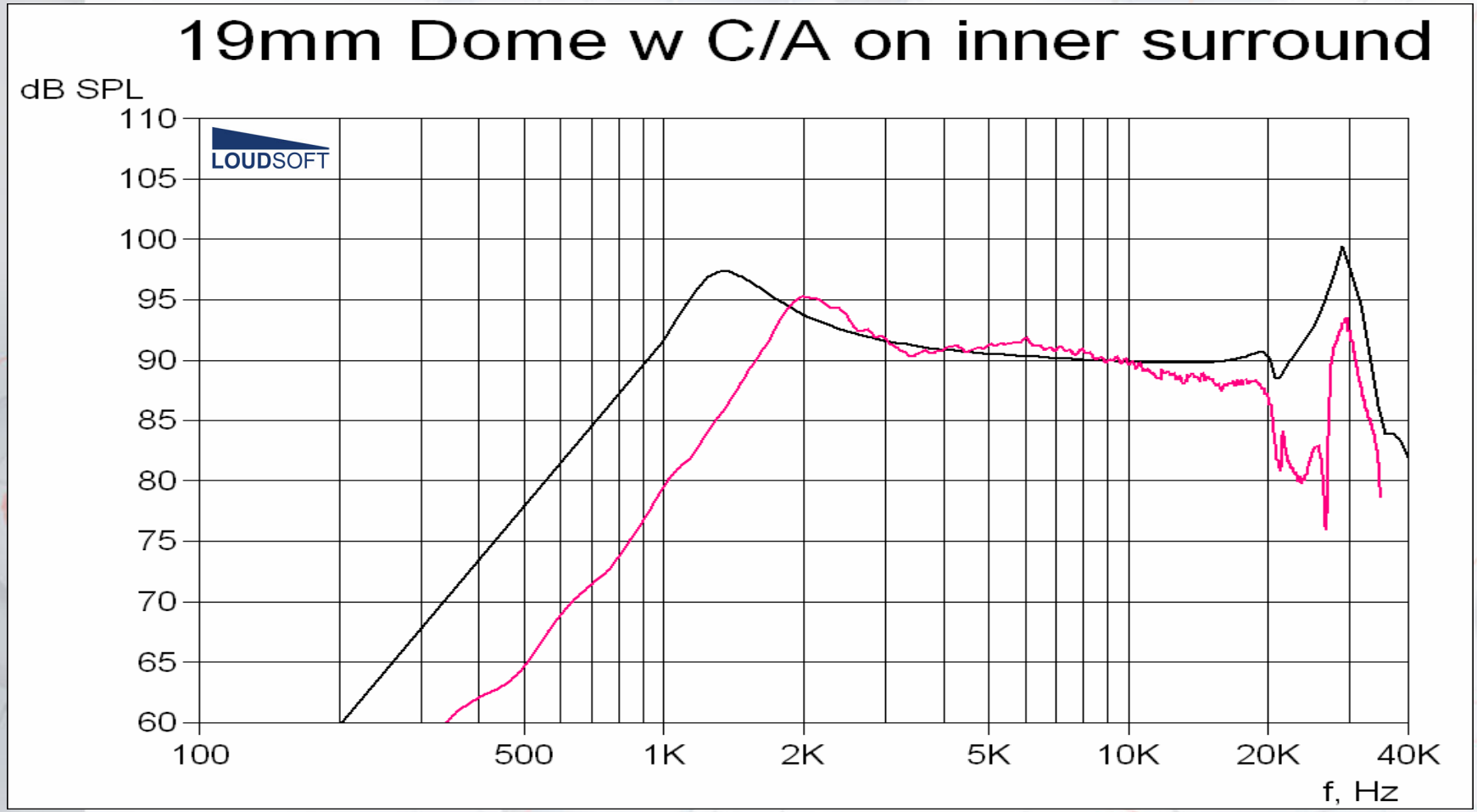
1st Break-up Mode @ 12499Hz
Dome Edge + VC Former



Simulated Impedance
Cavity resonance @ 1700Hz (Measured)




19mm Dome with response dip
dB SPL
LOUDSOFT
110
105
100
95
90
85
80
75
70
65
60
100
500
1K
2K
5K
10K
20K
40K
f, Hz


19mm Dome w C/A on inner surround
dB SPL
110
105
100
95
90
85
80
75
70
65
60
LOUDSOFT
100
500
1K
2K
5K
10K
20K
40K
f, Hz

- 2D FEA can be used for significant analysis and design of the acoustical components in loudspeakers
- 2D FEA is a valuable design tool for loudspeaker engineers