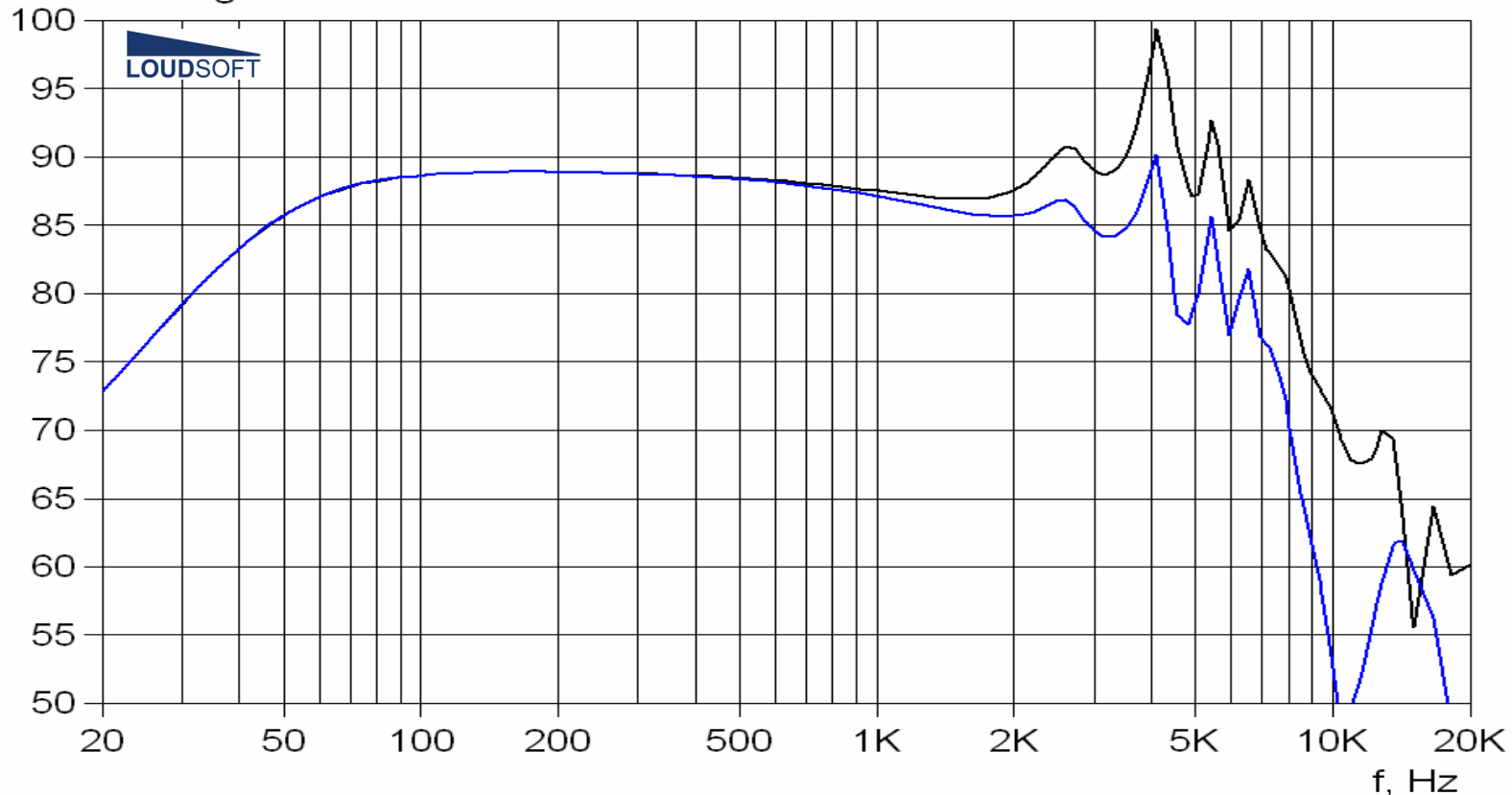


## 6½ Woofer Basic Example

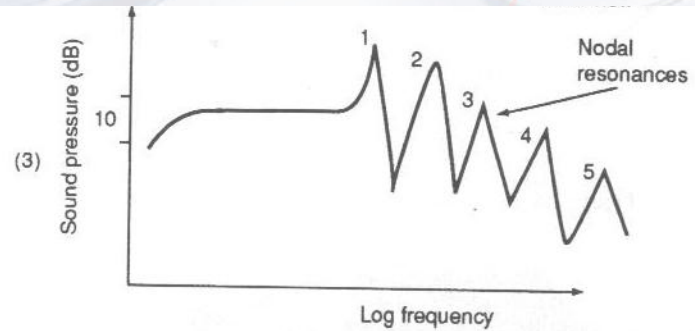
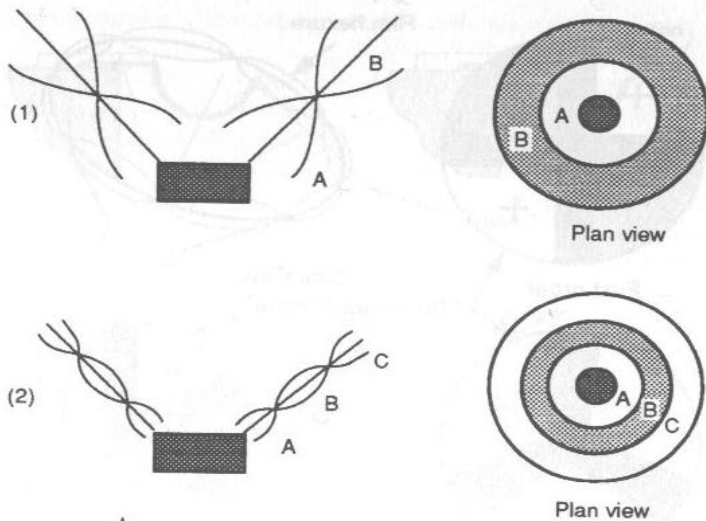
dB SPL - 0/30 deg



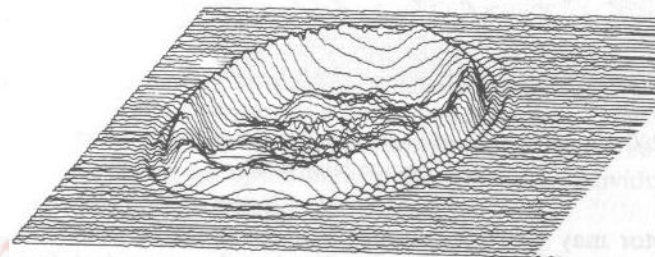
# Basic Symmetric Cone Modes

Ref. M.Colloms

## Cone Parameters

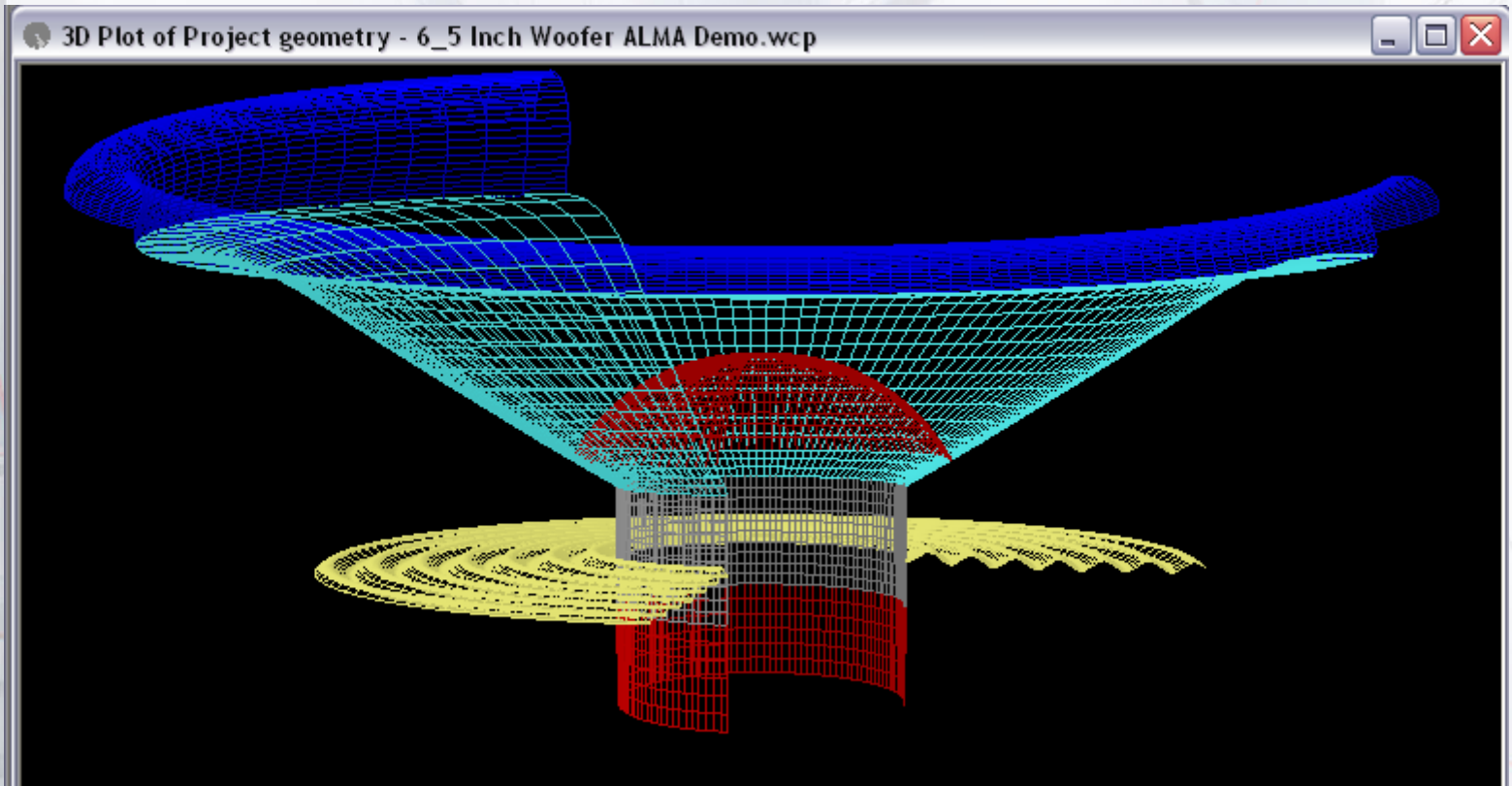


(a) Nodal resonances (concentric); (1) first nodal resonance, (2) second nodal resonance, (3) effect of nodal resonances on response

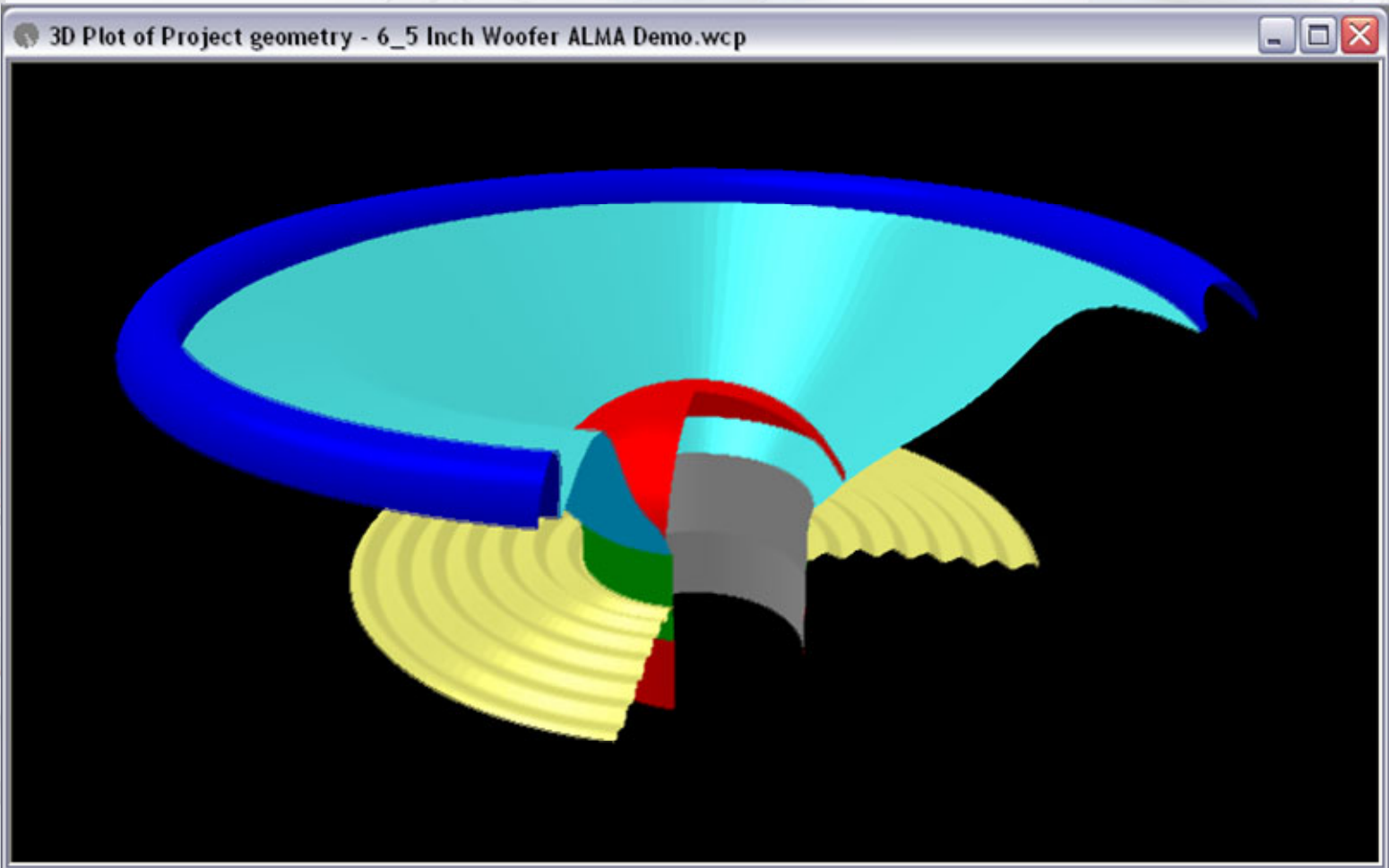


(b) 8 in (200 mm) curved paper cone, with surround,  $f=2.9$  kHz, bending resonance (nodal). (Celestion laser scan)

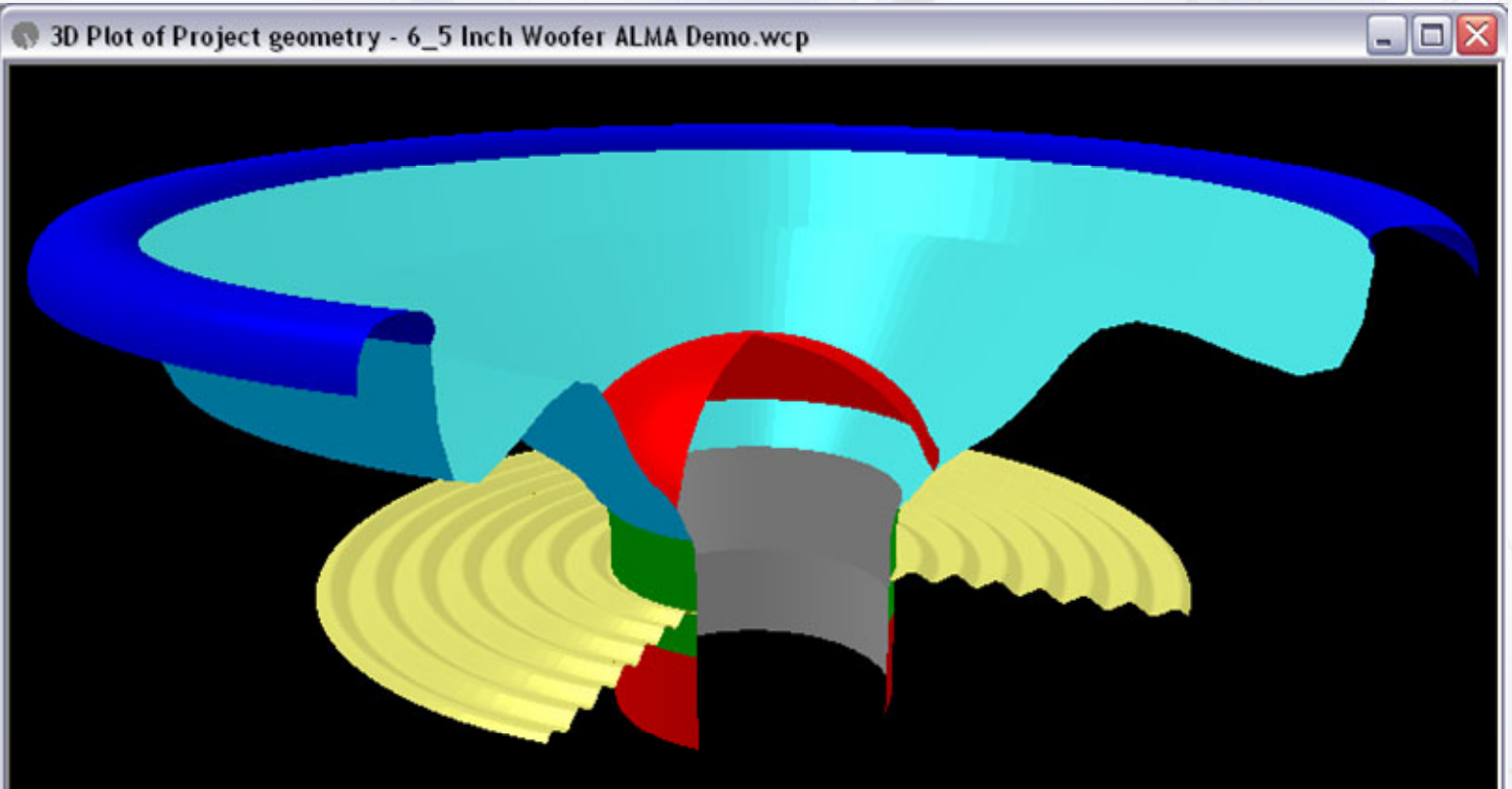
*Lowest Mode:  
Edge Bending @ 2589Hz*



*1st Cone Break-up Mode @ 4091Hz*

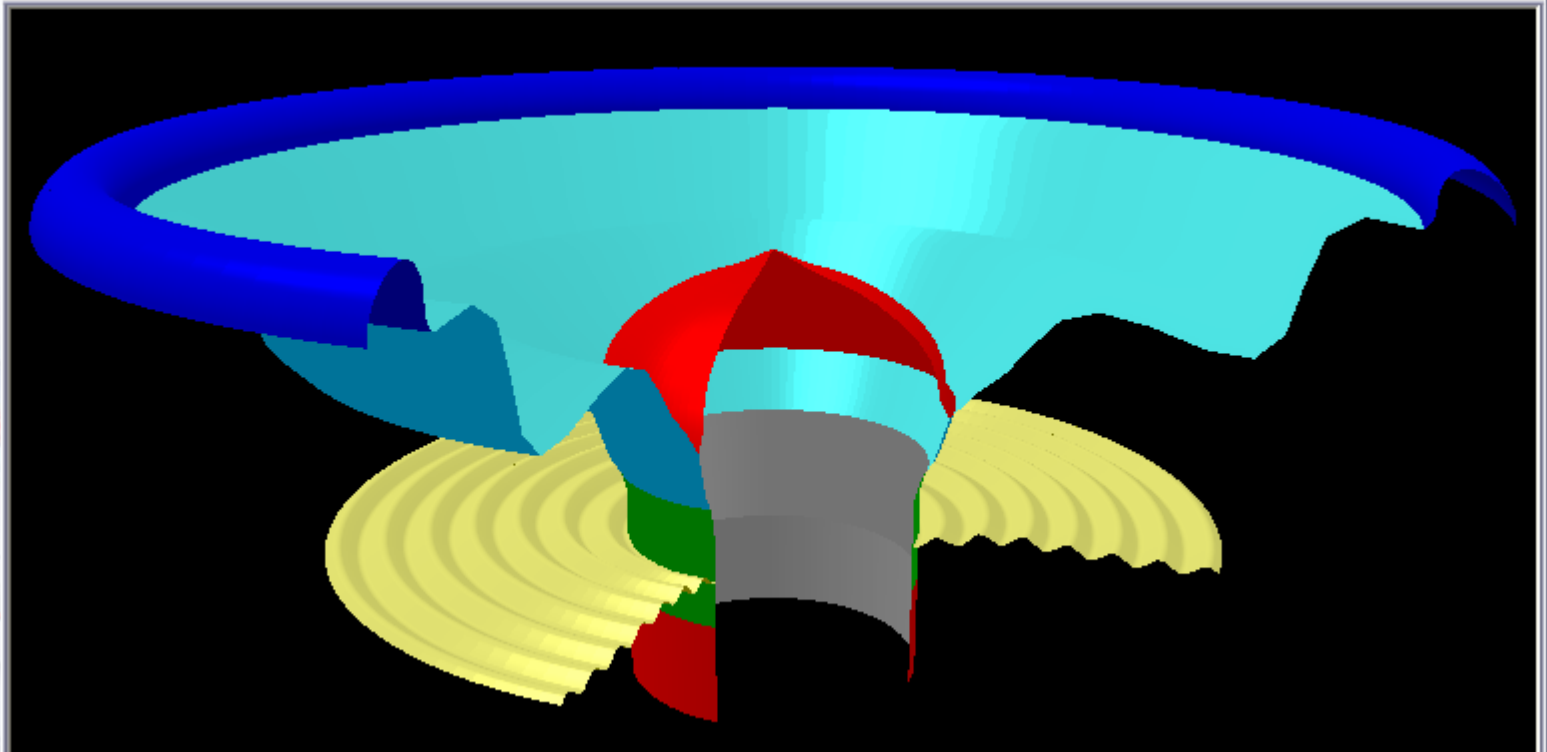


*2nd Cone Break-up Mode @ 5413Hz*

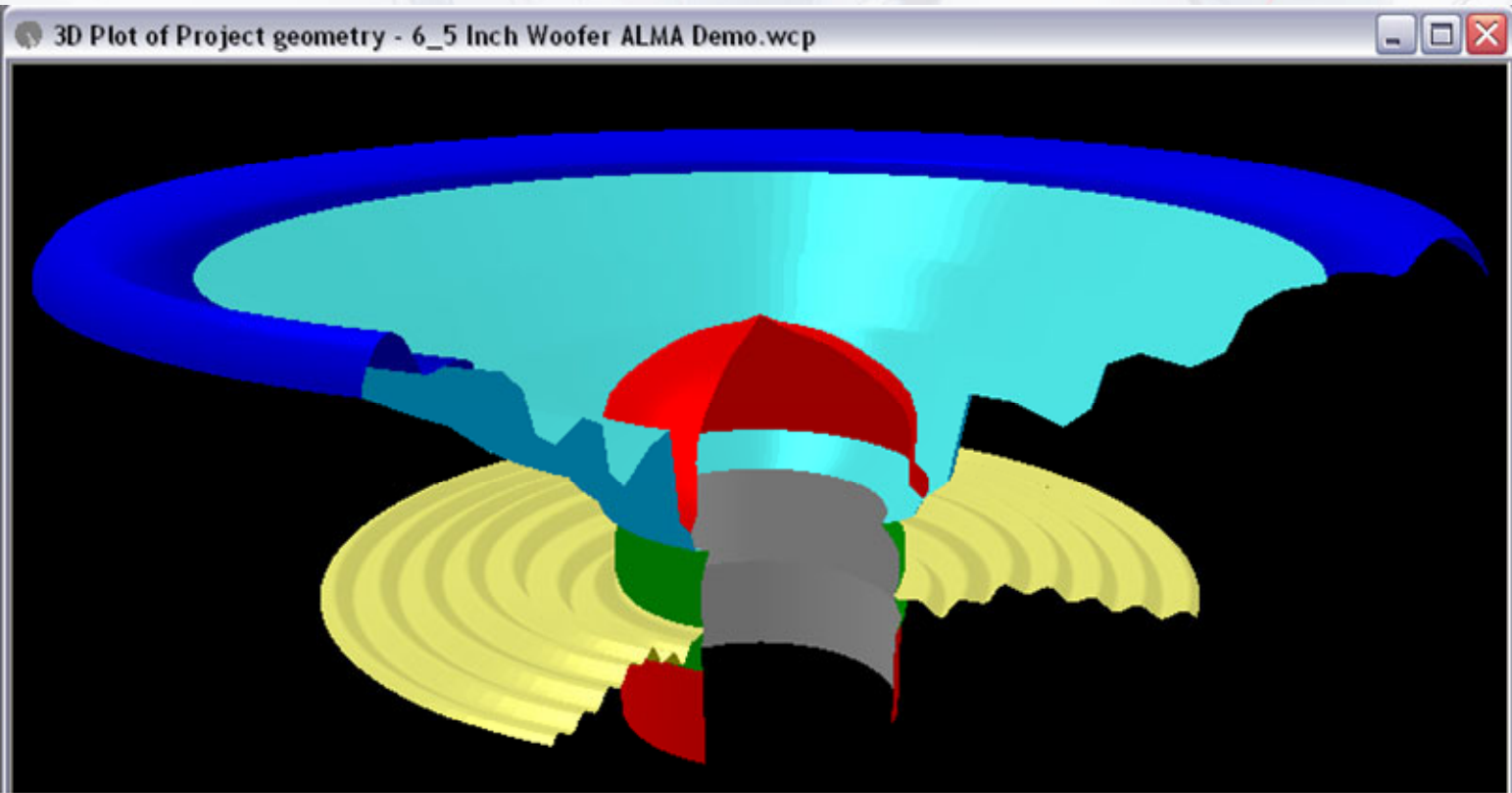


*3rd Cone Break-up Mode @ 6524Hz  
+ Dust cap break-up*

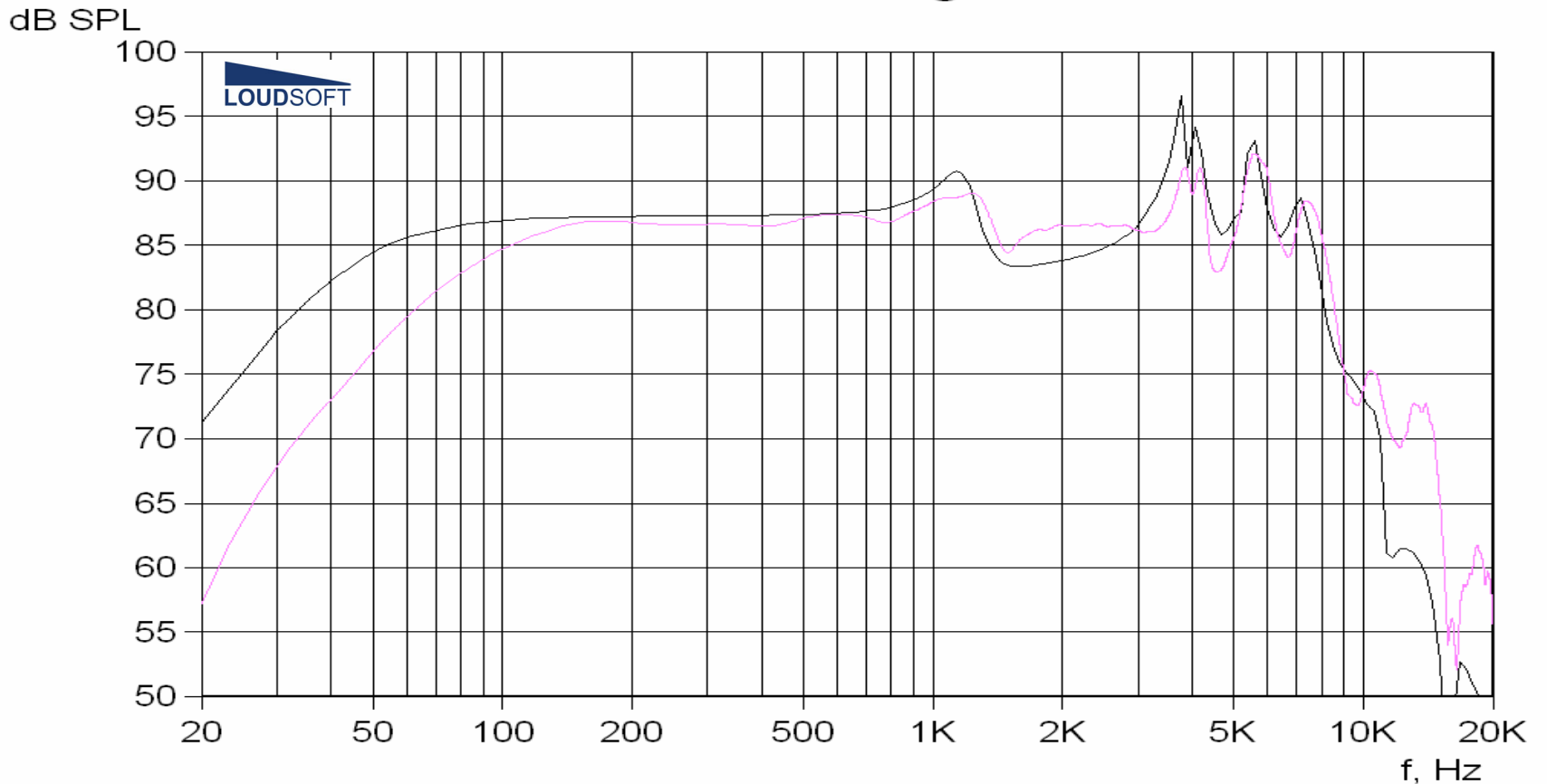
3D Plot of Project geometry - 6\_5 Inch Woofer ALMA Demo.wcp



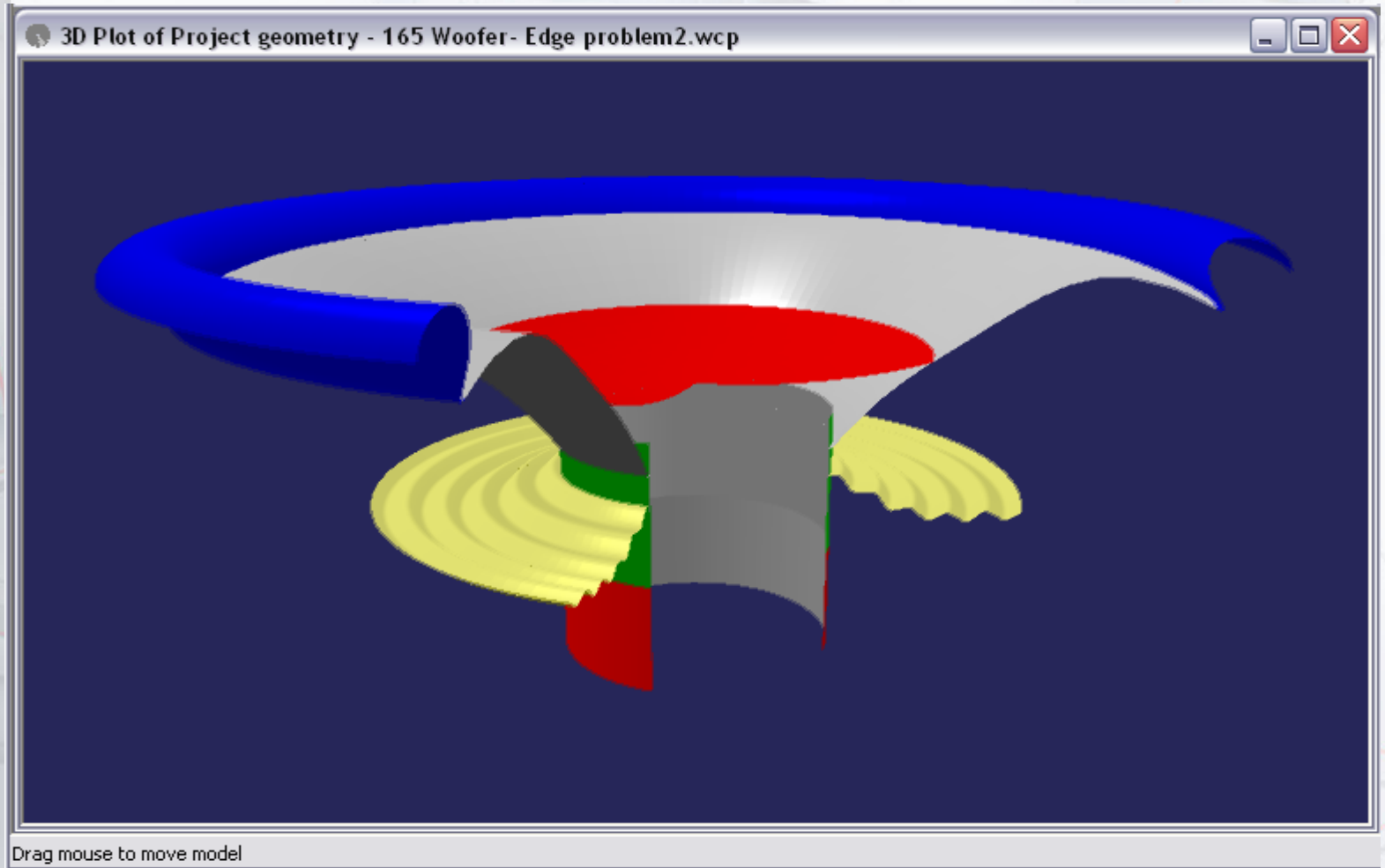
*High order Cone Break-up Mode @ 12541Hz*  
*Decaying amplitude*  
*Voice coil former bending*



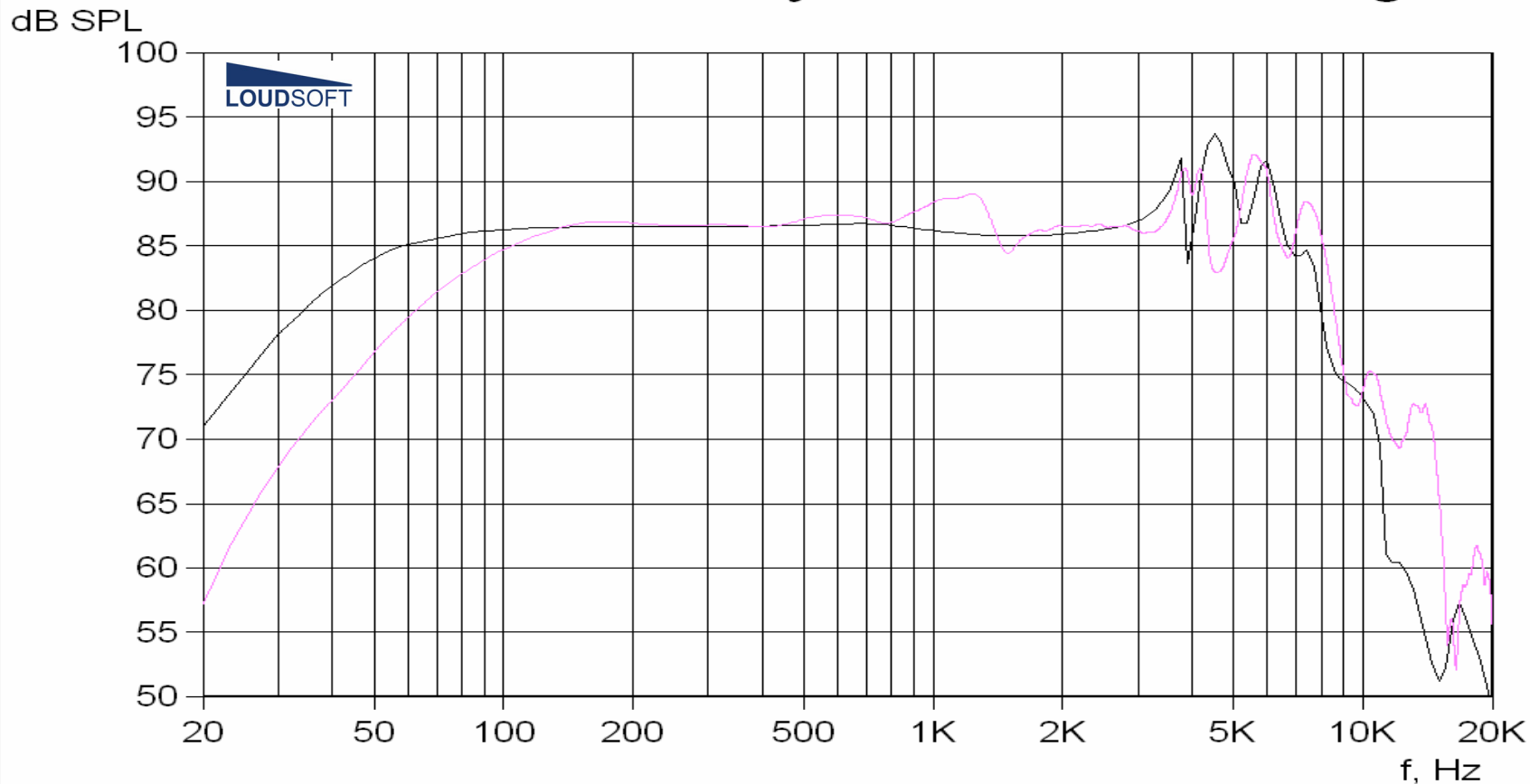
## 165 Woofer- Edge Problem



*Cone Edge Break-up @ 1617Hz*

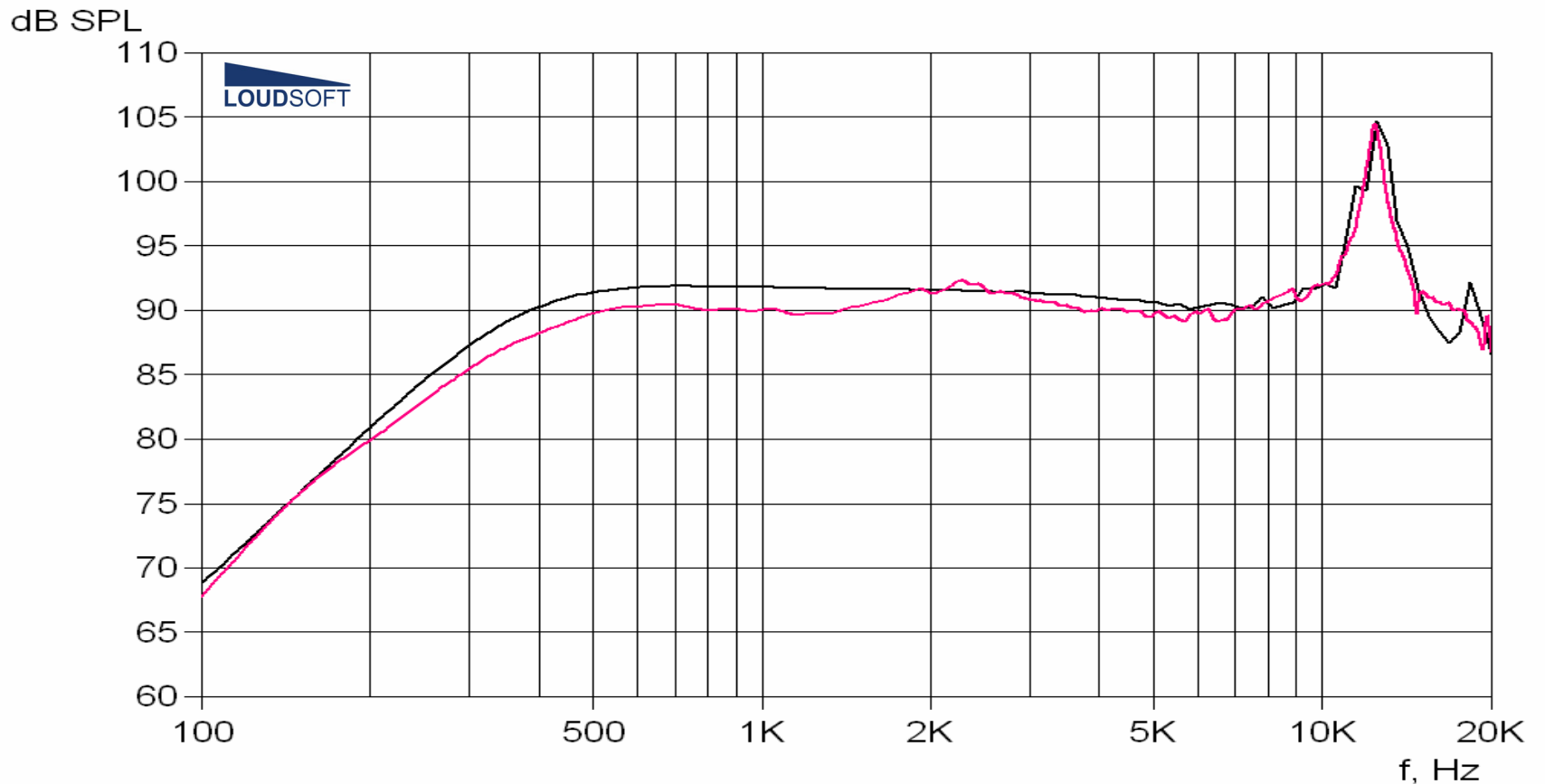


# 165 Woofer- Only Surround changed

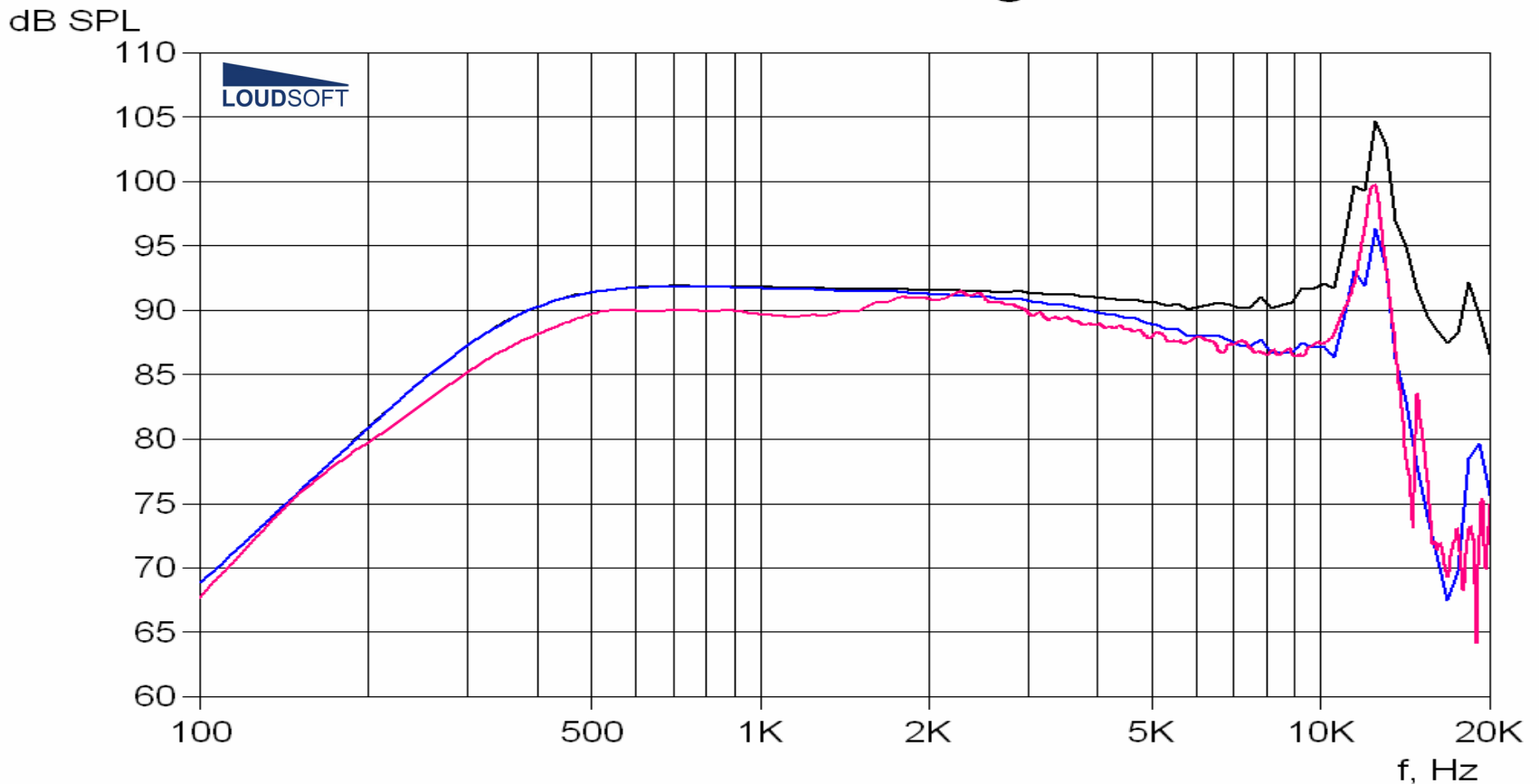


*2D FEA of 2 inch / 50mm Alu Dome  
Rear cavity included  
Pink = Measured*

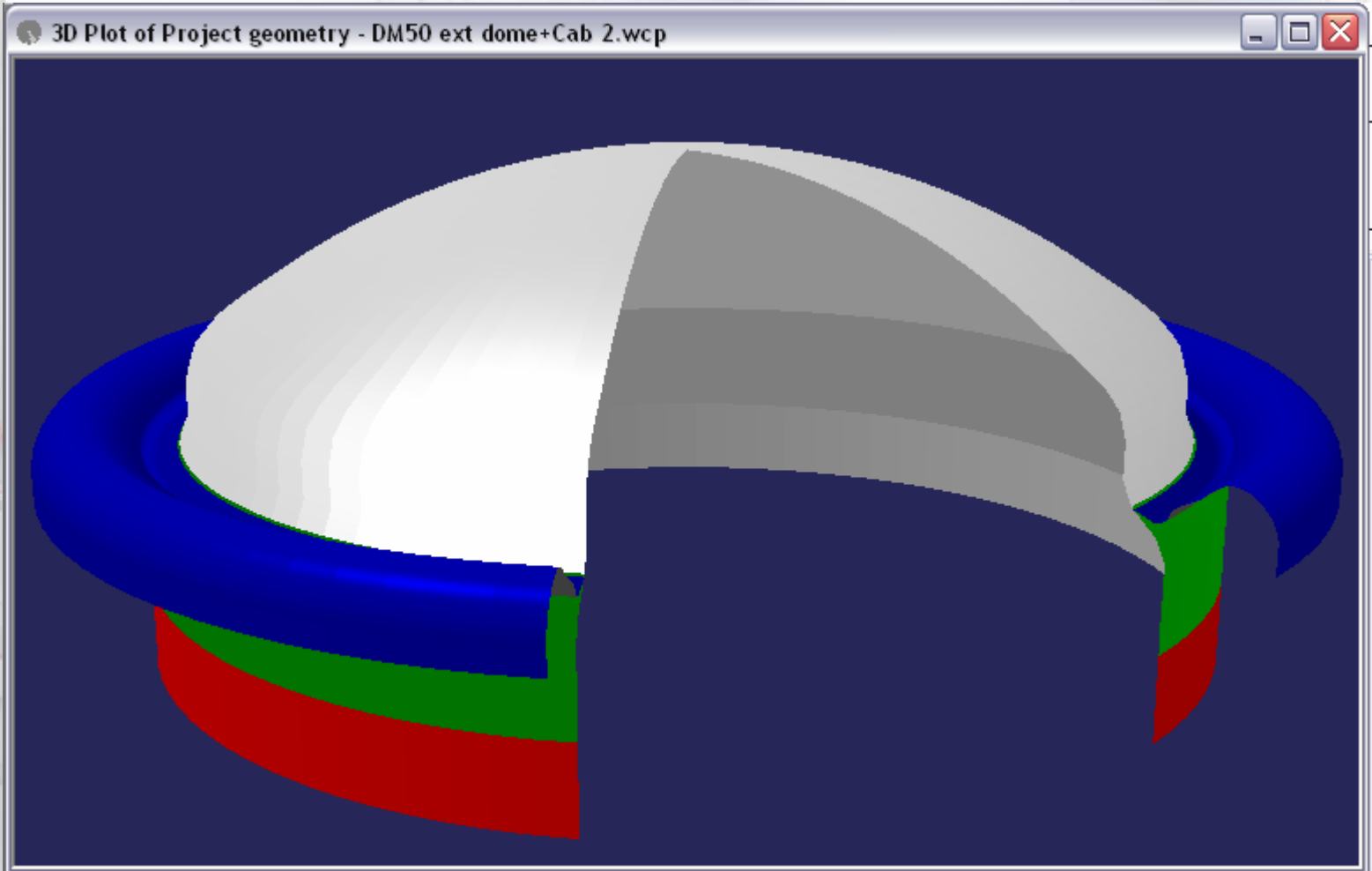
## DM50R-On axis



## DM50R-0 / 30 deg off axis

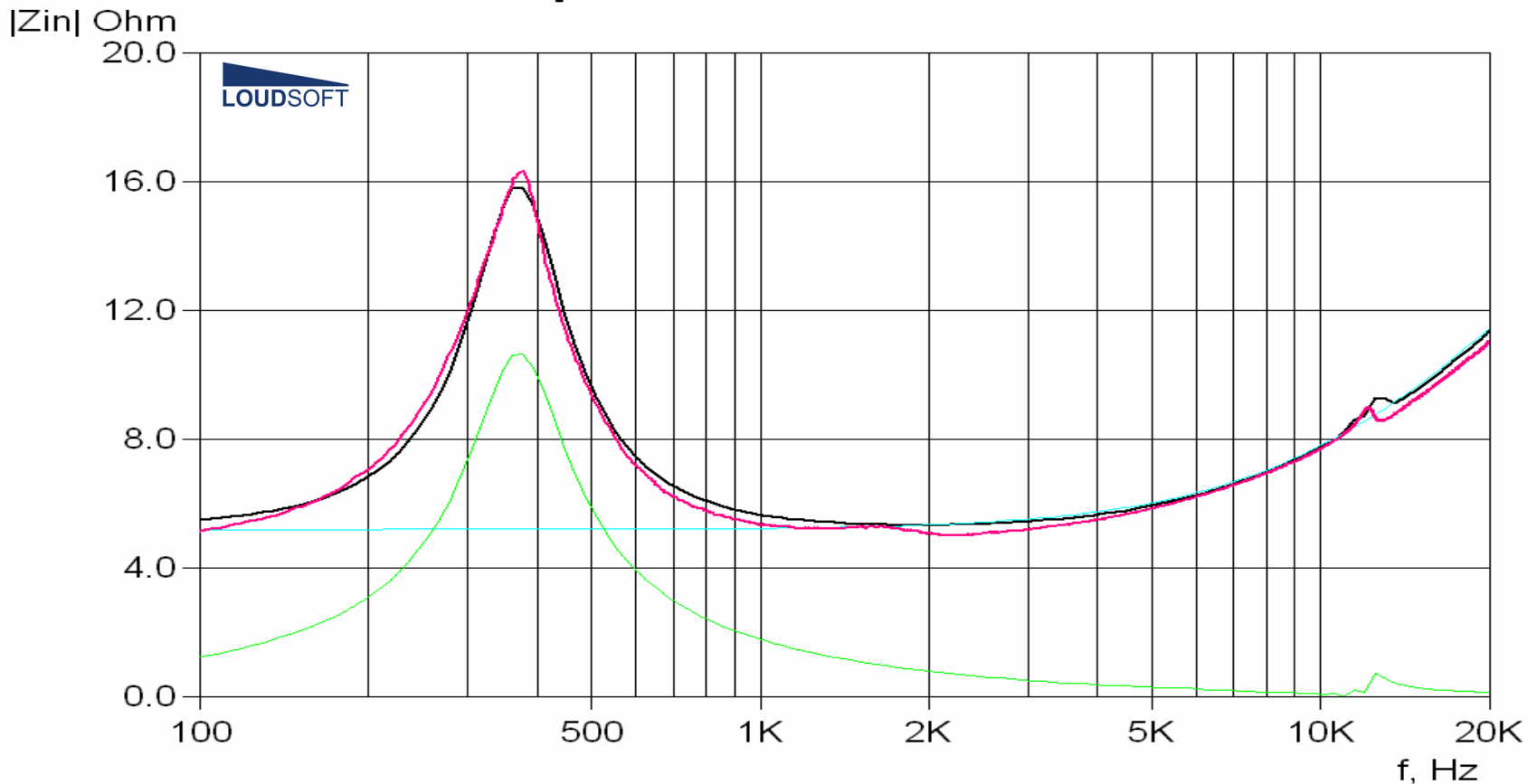


*1st Break-up Mode @ 12499Hz  
Dome Edge + VC Former*

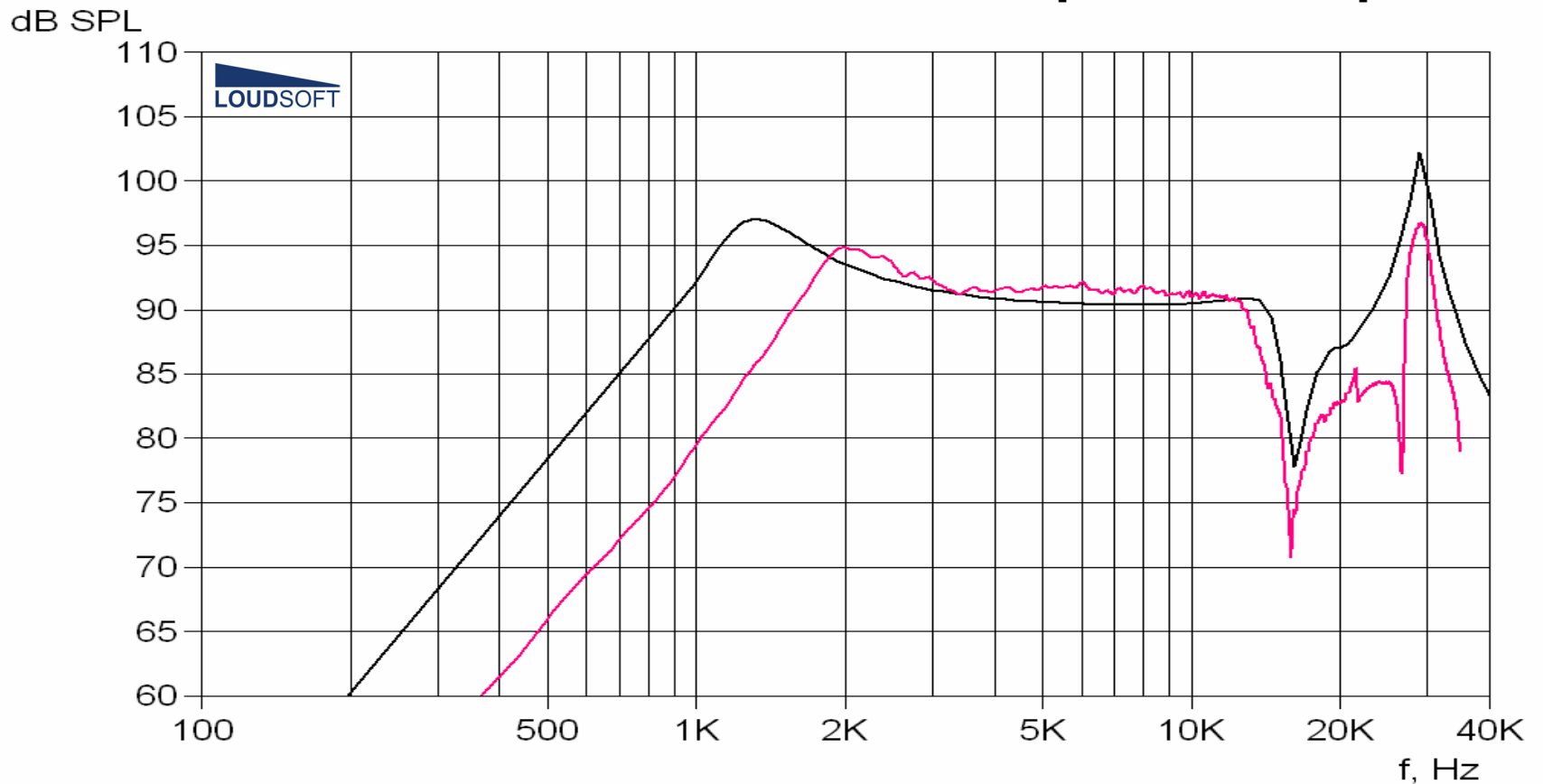


*Simulated Impedance*  
*Cavity resonance @ 1700Hz (Measured)*

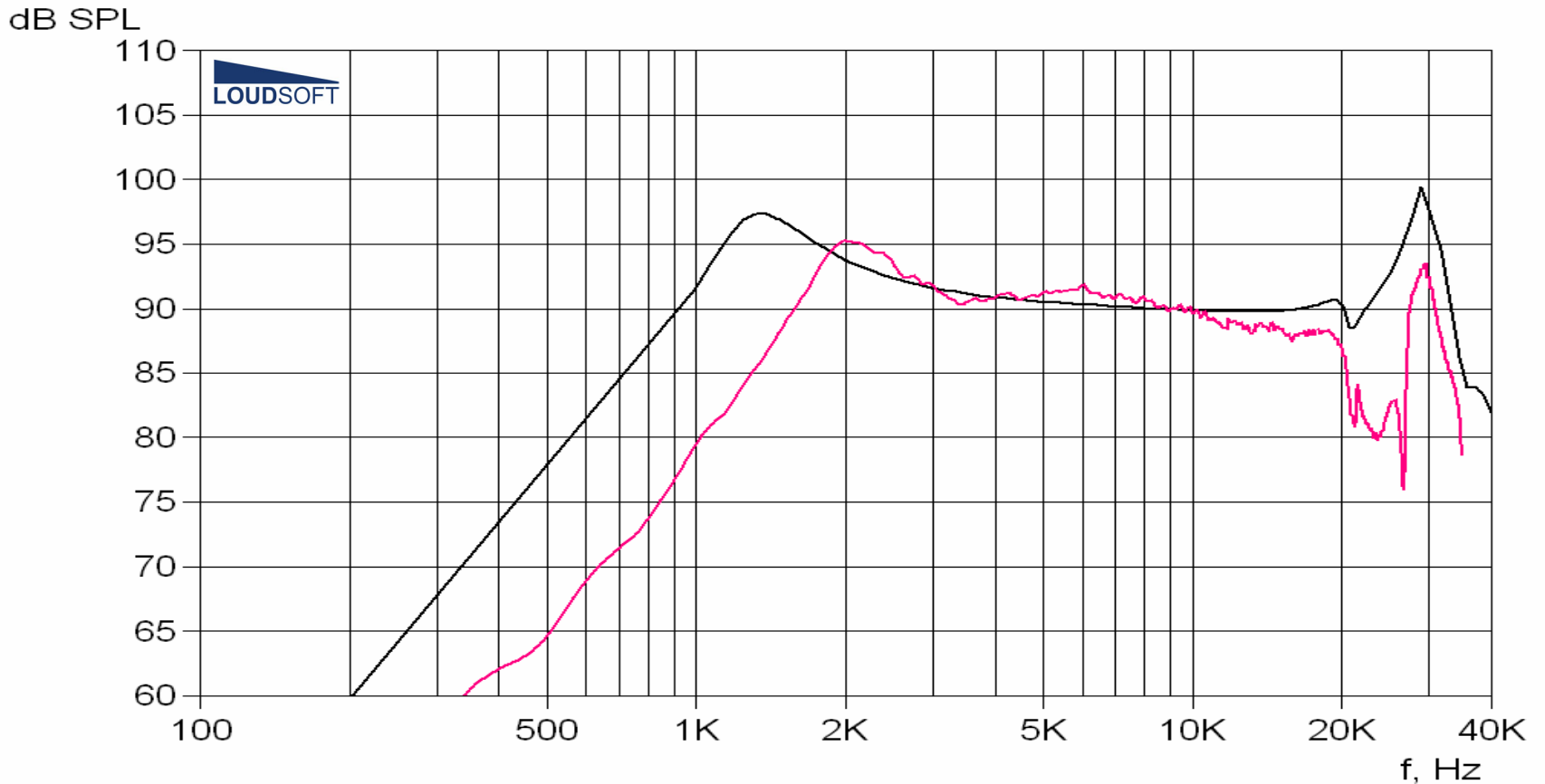
## DM50R Impedance with rear chamber



# 19mm Dome with response dip



# 19mm Dome w C/A on inner surround



- 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