

Question 22

Q: A piezoelectric speaker and a piezoelectric microphone are placed apart. Sound waves generated by the speaker are received by the microphone. How to analyze the model including both the speaker and microphone?

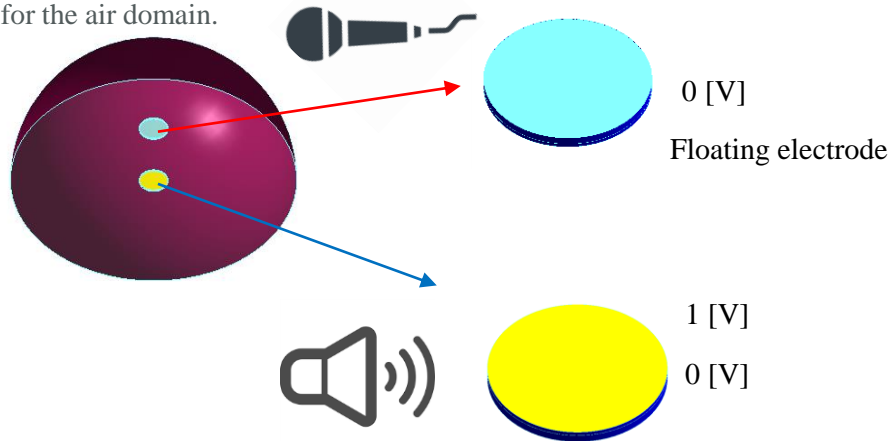
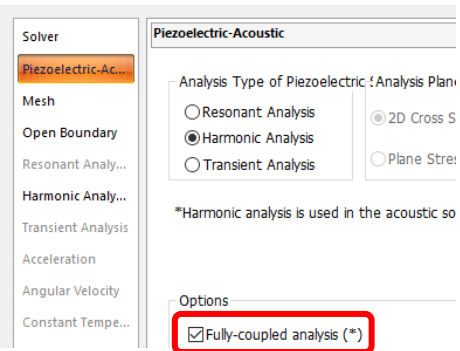
A: Create a model where a piezoelectric speaker and a piezoelectric microphone are placed in the air and then perform the piezoelectric-acoustic coupled analysis.

Please refer to the next slides.

Additional Information

1. Assemble a piezoelectric speaker and a piezoelectric microphone by bonding together a piezoelectric plate and an aluminum plate. (They are of the same structure)
2. Apply an AC voltage of 1 [V] at a frequency of 1.5 kHz to the speaker to generate sound waves.
3. Attach an electrode on each side of the microphone assembly, one for floating and the other as ground.
4. To analyze the speaker, perform a one-way analysis using the piezoelectric-acoustic coupled analysis, which analyzes piezoelectric-to-acoustic phenomena. To analyze both the speaker and microphone, perform a two-way analysis using fully coupled analysis, which analyzes piezoelectric-to-acoustic and acoustic-to-piezoelectric phenomena.
5. On the [Analysis Domain] tab in the [Edit Body Attribute] dialog box,
select [Piezoelectric Analysis (Rayleigh)] for both the microphone and speaker and
select [Acoustic Analysis (Mach)] for the air domain.

Analysis Condition Setting



Additional Information

The waveforms of the electric potential and displacement shown below indicate the microphone surely receives sound waves.

