🎒 Murata Software

Q: What type of boundary conditions can be set to a vibration source?

A: The applicable boundary conditions for a vibration source include [Displacement], [Speed], and [Acceleration].

Please refer to the next slide.

	Acoustic				
y/Conti	Boundary Conditio	n Type	Frequency Dependency		
	Displacement	OPressure	No	(0
	OSpeed	OSound Pressure Level	⊖ Yes	Magnitude 0.0	X10
	Acceleration	⊂Rigid wall			0
	Open boundar	Y		Phase 0.0	X10
		dance			



Mathematical expression of the boundary conditions: Let U be displacement, V be speed, A be acceleration, and ω be $2\pi f$. Each boundary condition has the relationships below.

 $U = U_0 \cos(\omega t + \theta_U)$

$$V = \frac{dU}{dt} = -U_0 \omega \sin(\omega t + \theta_U) = U_0 \omega \cos(\omega t + \theta_U + 90^\circ) = V_0 \cos(\omega t + \theta_V)$$
$$V_0 = U_0 \omega, \quad \theta_V = \theta_U + 90^\circ$$

 $A = \frac{dV}{dt} = \frac{d^2U}{dt^2} = -U_0\omega^2\cos(\omega t + \theta_U) = U_0\omega^2\cos(\omega t + \theta_U + 180^\circ) = A_0\cos(\omega t + \theta_A)$ $A_0 = U_0\omega^2, \quad \theta_A = \theta_V + 90^\circ = \theta_U + 180^\circ$