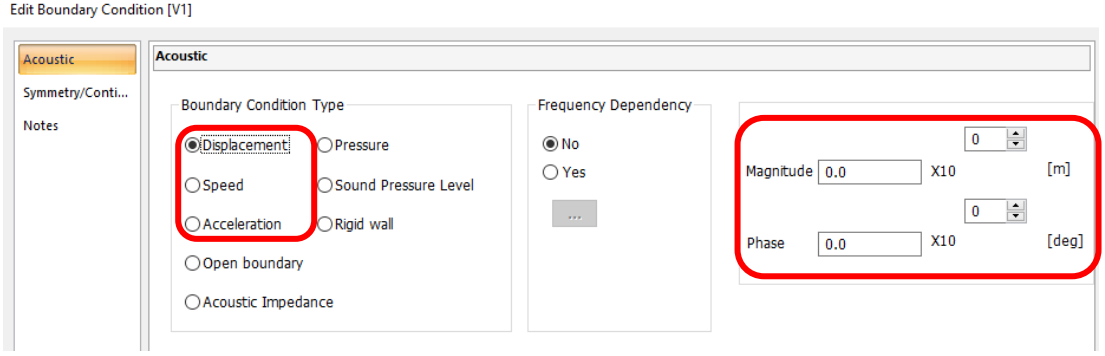
Question 3

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.



Additional Information

Mathematical expression of the boundary conditions:

Let U be displacement, V be speed, A be acceleration, and ω be 2πf.

Each boundary condition has the relationships below.

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

$$V = {}^{dU}/_{dt} = -U_0\omega\sin(\omega t + \theta_U) = U_0\omega\cos(\omega t + \theta_U + 90°) = \boldsymbol{V_0}\cos(\omega t + \boldsymbol{\theta_V})$$

$$\boldsymbol{V_0} = U_0\omega, \quad \boldsymbol{\theta_V} = \theta_U + 90°$$

$$A = {}^{dV}/_{dt} = {}^{d^2U}/_{dt^2} = -U_0\omega^2\cos(\omega t + \theta_U) = U_0\omega^2\cos(\omega t + \theta_U + 180°) = \boldsymbol{A_0}\cos(\omega t + \boldsymbol{\theta_A})$$

$$\boldsymbol{A_0} = U_0\omega^2, \quad \boldsymbol{\theta_A} = \theta_V + 90° = \theta_U + 180°$$