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**Q**: How to perform the analysis with initial stress taken into account?

**A**: By using the results import function, vibration analyses, such as harmonic and resonant analyses, can be performed with initial stress taken into account.

Please refer to the next slides.

- 1. By using the results import function, vibration analyses, such as harmonic and resonant analyses, can be performed with initial stress taken into account.
- 2. To obtain the distribution of initial stress, prepare 'Static\_Analysis\_Model' and analyze the model subjected to a static load in the static analysis of analysis type.
- 3. Using the [Copy into Project] function, copy the previous model into another model.
- 4. Change the analysis type from the static analysis to the resonant analysis.
- 5. Select [Specify Analysis Model] in the specify results and select 'Static\_Analysis\_Model', and then perform the analysis.

👻 fix

|                        |                          |                                      | Analysis Condition Se | etting                                       |                                       |  |  |
|------------------------|--------------------------|--------------------------------------|-----------------------|--|---------------------------------------|--|--|
| Project Tree           |                          | Project Tree                         | Colver                | Results Import                               |                                       |  |  |
| 🖃 🌐 гау_ех03*          |                          |                                      | Solver                |  |                                       |  |  |
| Static_Analysis_Mode   | 1*                       | - of Charle Analysis Markelt         | Piezoelectric An      |  |                                       |  |  |
|                        | Copy Ctrl+C              | Besonant Analysis Model*             | Mesh                  | Import Type                                  | Specify Results                       |  |  |
| - 🖾 Model unit: m      | Paste Ctrl+V             |                                      | Open Boundary         | ONone  | Specify Analysis Model                |  |  |
| 68 Analysis Con        | Copy Into Project alysis | Model unit: mm/3D                    | Resonant Analy        | O Deformed Shape                             | No selection ~                        |  |  |
| i - V i lower          | Delete                   |                                      | Harmonic Analy        | Initial Stress     (Deformed shape included) | No selection<br>Static Analysis Model |  |  |
| 🖬 🗸 🏜 upper            |                          | 😑 🖓 Body Attributes                  | Transient Analysis    | (beformed shape medded)                      | Resonant_Analysis_Model               |  |  |
| - Body Attril          | Rename                   | 🔬 📈 📸 lower                          | Transiene Analysis    | Pressure                                     | Reference                             |  |  |
| - 🔬 Materials          | Run Mesher/Solver        | 🗈 🗹 🔊 upper                          | Step/Thermal Lo       | <ul> <li>Initial Temperature</li> </ul>      |                                       |  |  |
| i                      |                          | 🛓 👘 📴 Body Attribute Data            | Acceleration          | Reached Temperature                          | Specify Mode                          |  |  |
| 🗄 🧻 🚺 Material Di      | Create 2D Model          | - 🚇 Materials                        | Angular Velocity      | Initial Values for Eluid Analysis            | Automatic (Use the last result)       |  |  |
| <ul> <li></li></ul>    |                          | i∎                                   | Constant Tempe        |  | Manual 0                              |  |  |
|                        |                          | 🔬 📔 Material Data                    | In the Local Code     | Heat Density<br>(Loss Density)               |                                       |  |  |
|                        |                          | Boundary Conditions                  | Fudbal evel Setti     |  | Select from No selection              |  |  |
| · · · · <del>-</del> · |                          | Pair Setting (Periodic boundary etc) | Results Import        | Restart Information                          | cite isc                              |  |  |
|                        |                          |                                      | Notes                 |  | Match Time                            |  |  |
|                        |                          | 🛱 🗸 🐳 earth                          |                       |  |                                       |  |  |

## Results



## Displacement Contour from Resonant Analysis



## Static analysis result imported

Table

| Spread of resonant and antiresonant frequencies [H<br>Resonant frequency [Hz] Co |   |                   | uencies [Hz]<br>Conver | z]   Coupling coefficient[%]   Re<br>invergence Judgment |                   | Resonant resistance [ohm]   Eq<br>  Damping capacitance [ |                |          |
|--|---|-------------------|------------------------|--|-------------------|---|----------------|----------|
|  |   |                   | Frequenc               | Resonant freq  | uency [Hz] / Real | Resonant frequer  | ncy [Hz] / Ima | ginary   |
|  | T | 0:1.432394e+04Hz  | 1.432e+4               |  | 1.432e+4          |   |                | 1.092e+C |
|  |   | 1:1.851404e+04Hz  | 1.851e+4               |  | 1.851e+4          |   |                | 2.336e+C |
|  | l | 2: 5.203033e+04Hz | 5.203e+4               |  | 5.203e+4          |   |                | 1.236e+1 |

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## Static analysis result not imported

| read of resonant and antir | resonant freq | uencies [Hz] | s [Hz] Coupling coefficient[%] |                 | Resonant resistance [ohm] Eq |         |  |
|----------------------------|---------------|--------------|--------------------------------|-----------------|------------------------------|---------|--|
| sonant frequency [Hz]      |               | Conve        | ergence Judgment               |                 | Damping capacita             | ance (I |  |
|                            | Frequenc      | Resonant fre | quency [Hz] / Real             | Resonant freque | ncy [Hz] / Imagina           | ry      |  |
| 0: 6.681322e+03Hz          | 6.681e+3      |              | 6.681e+                        | 3               | 1                            | 1.683   |  |
| 1: 1.306505e+04Hz          | 1.307e+4      |              | 1.307e+                        | ŧ               | 3                            | 3.333   |  |
| 2: 4.026197e+04Hz          | 4.026e+4      |              | 4.026e+                        | ł               | 10                           | ). 166  |  |

The resonant frequencies differ between with and without results import. When results are imported, higher resonant frequencies are obtained.

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