Assembly Vibration Evaluation System “NewtonSuite-AVES”

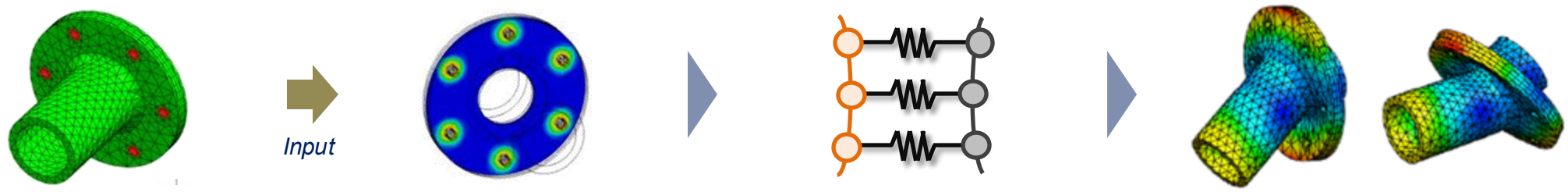
- Overview -

NewtonSuite-AVES is a CAE tool specialized in modeling contact boundaries in vibration analysis.
It connects the contact boundaries of assembly structures with surface stiffness based on pressure distribution.
Applications include bolted structures, brake units, motor units, connector units, etc.

- Operational flow -

AVES performs the following sequence of steps:

1. Calculation of contact pressure distribution using highly accurate nonlinear contact analysis.
2. Conversion of contact pressure distribution to contact surface stiffness distribution.
3. Vibration analysis considering contact surface stiffness.

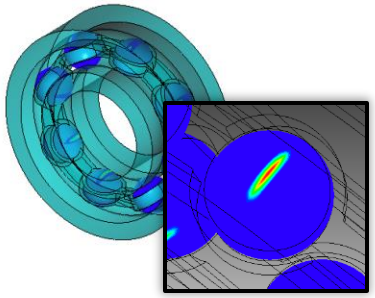


Assembly Vibration Evaluation System “NewtonSuite-AVES”

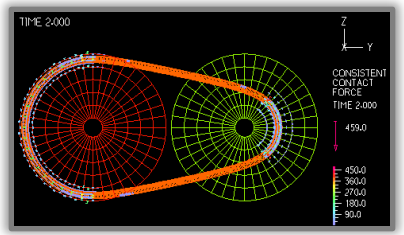
- Features for assembly vibration analysis -

● Premier finite element program

- Reliable finite element program enable solving the most difficult nonlinear contact problems.



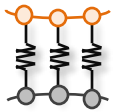
Example: Contact in bearings



Example: Contact in CVT

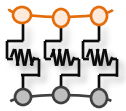
● Contact surface stiffness

- It is defined as the distributed stiffness as a function of pressure.
- It is defined separately for normal and tangential directions.



Normal direction

$$k_{\mathrm{N}} = Ap^{B}$$

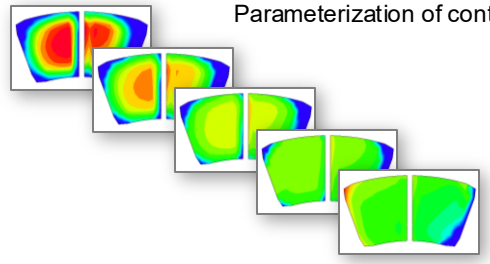


Tangential direction

$$k_{\mathrm{T}} = Cp^{D}k_{\mathrm{N}}$$

● Contact pressure data input

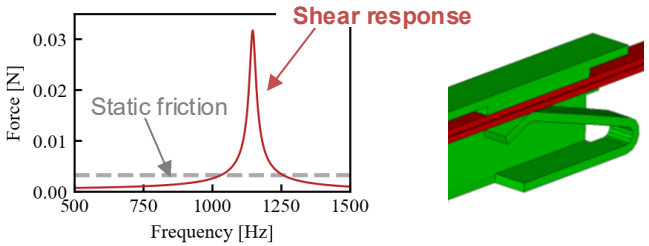
- It is possible to use freely defined contact pressure distributions, not limited to the results of contact analysis.



Parameterization of contact pressure distribution

● Contact-related response analysis

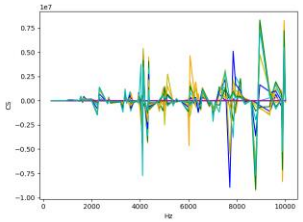
- It is possible to calculate the relative displacement response and pressure response at the contact surface.



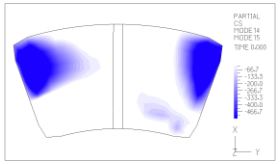
Contact point response of connector

● Dynamic stability analysis for brake

- Dynamic stability can be evaluated using asymmetric stiffness due to friction.



Stability evaluation based on real eigenvalues

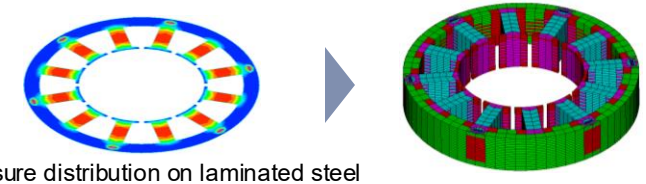


Visualization of energy input regions

● Laminated stator and motor unit modeling

- The anisotropy of laminated stators can be estimated without testing.
- Assembly modeling with stator, coil and frame is possible.

Pressure-dependent anisotropic properties



Pressure distribution on laminated steel