

## **Development of Efficient FEM Analysis Method using Equivalent 2D Model for Linear Friction Welding Analysis**

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Linear friction welding(LFW) is one of the methods in accordance with the SDGs in machine-parts production processes. Lately the method has been used for not only airplane production but also automobile production owing to its rationality.

In the LFW process two machine-parts are bonded with their surfaces in solid phase with the friction-heat brought by lateral oscillation with each other. It needs neither big facilities like large electric energy sources nor other materials as in the arc welding.

But when the LFW analysis are planned the analysis models are usually prepared in 3D models. That is because LFW processes include 3D loads and 3D deformations. And accordingly the model becomes so big that it takes much calculation time and long development period.

We intended to develop 2D model for this analysis with the following method. In the LFW process small pressures normal to the friction surface are occurred through the lateral oscillating motions of the blanks. These pressures are important but lost in the 2D model.

We introduced the body-force field representing the upper-mentioned pressures in the 2D model. And the body-force field is generated by the centrifugal force on the blank considering that the pressure-forces are independent of the push force of the blanks.

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