Tohoku Univ. Technology

Simulation for metal additive manufacturing

Enables high-speed numerical computation that can be used in parallel with additive manufacturing processes.

Overview

The development of a multi-scale numerical analysis technique for the melting and solidification phenomena of metal powders in metal lamination processes, such as powder bed fusion and electron beam melting, is progressing. Conventionally, the analysis has been carried out based on equations based on physical phenomena. However, the calculation load increases as the calculation becomes more precise, and it is difficult to calculate the whole structure. In order to reduce the load, there is a method to average microstructural information such as particle size distribution, phase fraction, and crystal orientation distribution. However, it is difficult to predict the formation behavior of micro defects such as unmelted powder, porosity, and cracks.

The present invention solves the problem by replacing a part of the numerical analysis process with a surrogate model based on machine learning, and enables numerical analysis on the scale of the whole shaped object. By effectively integrating the macroscale analysis and the surrogate model, multi-scale analysis is realized which avoids loss of microstructural information while suppressing the computational load. By this, the computational load is reduced to 1/10, and the whole shaped object can be calculated.

To suppress smoke phenomenon

The patent for this technology is in unpublished status. If there is a company that is interested, please do not hesitate to contact us.

Product Application

- ☐ Metal additive manufacturing equipment

Related Works

IP Data

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