

**Temporal Multiscale Methodology to Perform Finite Strain Elastoplastic Analyses under
Cyclic Loads**

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High cycle fatigue problems are generally solved as linearly elastic problems. However, low cycle fatigue problems, in which material and geometric nonlinearities play important roles, have to be solved as finite strain elastic-plastic problems. Entire deformation history while the structure is subject to cyclic loads must be analyzed. Nonlinear finite element analysis for 100~10000 load cycles involving strong nonlinearities needs to be performed. The computation may involve a tremendous number of nonlinear load steps and therefore it is too consuming. Therefore, we are developing a temporal multiscale analysis methodology such that many of cyclic loading steps can be skipped. At the conference, we will present some formations and simple example problems.

Keywords: Cyclic loading, Temporal multiscale method, Nonlinear finite element analysis