The 24th Computational Engineering Conference of JSCES

特別講演・計算工学大賞授賞式

The JSCES Grand Prize 2018 Ceremony

2018 年度計算工学大賞を受賞された米国コロンビア大学の Jacob Fish 教授の特別講演を開催致します。特別講演の参加費は無料です。多数のご参加をお待ちしております。

日 時 / Date　２０１９年５月３０日（木）１６：１５－１７：３０
会 場 / Place　ソニックシティホール４階　国際会議室
司 会 / Chair　Daigoro Isobe（University of Tsukuba）

I 特別講演 Award Lecture　１６：１５－１７：１５*

PRACTICAL MULTISCALE FRAMEWORK

Jacob Fish #

Carleton Chaired Professor, Columbia University / Chief Scientific Advisor, Altair

Abstract The talk presents a practical multiscale framework, which possesses the following salient features: (i) computational efficiency, (ii) absence of the usual scale separation assumption, and (iii) reliance only on limited experimental data for its calibration. The multiscale software developed based on this framework, known as the Multiscale Designer, has been deployed by hundreds of industrial users around the globe including, but not limited to: aerospace industry (Lockheed-Martin, Northrop-Grumman, Boeing, Rolls-Royce, Airbus, General Electric, Blue Origin, etc.) for durability, life prediction and environmental degradation of ceramic- and polymer- based composite components, automotive industry (General Motors, Ford, Chrysler, etc.) for crash prediction of composite cars, electronics industry (HP, Motorola, etc.), and other industries, such as healthcare, consumer goods, civil engineering, just to name a few. The formulation is endowed with fine-scale details, introduces no scale separation, makes no assumption about infinitesimality of the fine-scale features, requires no higher order continuity, introduces no new degrees-of-freedom, is free of higher order boundary conditions and employs model hierarchy that permits reliance on limited experimental database. The computational efficiency of the formulation stems from the residual-free formulation that eliminates the bottleneck of satisfying fine-scale equilibrium equations and hybrid impotent-incompatible eigenstrain formulation that alleviates locking arising from a lower order approximation of eigenstrains. The formulation employs models of various fidelity. A high-fidelity model (HFM) is first calibrated to limited experimental data. Subsequently, the HFM is employed to train a low fidelity model (LFM). Finally, the calibrated low fidelity model is utilized for component analysis. The rational for utilizing HFM in the initial stage stems from the fact that constitutive laws of individual microphases in HFM are rather simple, so that the number of material parameters that needs to be identified is less than in the LFM. The added complexity of material models in LFM is necessary to compensate for simplified kinematical assumptions made in LFM and for smearing discrete defect structure. The first or higher order computational homogenization model, which resolves microstructural details including the structure of defects, such as voids, dry spots and residual stresses resulting from the manufacturing process, is employed as the HFM, whereas the reduced order approach, is employed as the LFM. The talk includes theory and applications in aerospace, automotive, healthcare and civil engineering industries.

https://www.multi-scale.com/　https://altairhyperworks.com/product/Multiscale-Designer

II 計算工学大賞授賞式 Grand Prize Ceremony　１７：１５*－１７：３０

Jacob Fish 先生の講演の後、計算工学大賞授賞式を行います。

一般社団法人 日本計算工学会
The Japan Society for Computational Engineering and Science

* 予定時刻となります。