STS 25

Japan Session 1 – Industrial Application of Extended CAE for the Implementation of Emerging Technologies

Chairs: Tohru Hirano* and Genki Yagawa**

* Daikin Information Systems Co. Ltd., Osaka, Japan, tohru.hirano@daikin.co.jp
** University of Tokyo and Toyo University, Saitama, Japan, yagawag@gmail.com

Session Abstract

Keywords: *CAE, Internet of Things (IoT), Artificial Intelligence (AI), Cyber Physical System (CPS), Digital Twin, Environmental Protection, Transportation*

Recently, many new innovative technologies such as Internet of Things (IoT), Artificial Intelligence (AI), 5G, Cyber Physical System (CPS) are emerging, and manufacturing industries are facing with the disruptive change for their business paradigm.

Moreover, modern manufacturing industries are also confronting with strong consciousness on contributing to the environmental protection of the world.

In the last WCCM XIII Mini-symposium MS1314, we have defined Extended CAE [1] to include not only the design synthesis and optimization but also the IoT and AI technology.

Also, in the last 15th USNCCM Mini-symposium MS704, we have discussed on the real world modelling [2] (Digital Twin) on the Cyber Physical System for the realization of Society5.0 [3]. In this WCCM XIV, we will have Mini-symposium MS196 on 'Leveraging Extended CAE Technology Toward the Realization of Human-Centred Society 5.0'.

In this Japan-STS Industrial Session, we would like to introduce several activities of Japanese Enterprises on the implementation of those emerging technologies into the products, processes and services. Especially concerning to the implementation of those new technologies into the new products and the manufacturing processes, the methodology changes for the realization of the products and processes are required, which sometimes invokes the material change and also structural optimization.

Another application of emerging technology are introduced for the development of the new thermo-electric materials in view of the collaboration between AI and materials scientists.

As the keynote speech, the implementation of Statistical Mathematics and Machine Learning technology for Digital Twin in the automobile safety designs will be also discussed.

This industrial session will cover those widespread modelling and application technologies, which will integrate computational engineering and information engineering with the help of extended CAE technology.

References

[1]   T. Hirano, "*Defining Extended CAE Technology toward the Integration of CAE and AI*", WCCM XIII, MS1314, July 24, (2018)

[2]   T. Hirano, "*Integration of CAE and AI on the Cyber Physical Systems for the Foundation of Society5.0*", 15th USNCCM, MS704, July 28 - August 1, (2019)

[3]   https://www8.cao.go.jp/cstp/english/society5_0/index.html

List of tentative paper titles and speakers of STS 25:

Speech 1 (15 min.)

Introduction: Integration of Statistical Mathematics and Machine Learning with CAE Expands the New Digital World for Manufacturing Industries

Tohru Hirano, Daikin Information Systems Co. Ltd., tohru.hirano@daikin.co.jp

Speech 2 (30 min.)

Shape Optimization of Catalyst Pellets for the Improvement of Synthesizing Process of Environmentally Friendly Refrigerants

Jihong Liu, Daikin Industries Ltd., jihong.liu@daikin.co.jp

Speech 3 (30 min.)

Development of New Thermoelectric Material through Collaboration between AI and Materials Scientists

Masahiko Ishida, NEC Corporation, ishida@ah.jp.nec.com

Speech 4 (Keynote, 45 min.)

Parametric Model Reduction and Surrogate Modelling of Structural Deformations from Full Model Car Crash Analyses

Tsuyoshi Yasuki, TOYOTA Motor Corporation, tsuyoshi_yasuki@mail.toyota.co.jp