# *Damage Assessment of Orthotropic Steel Bridge Decks*

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As for the long-span bridges, moveable bridges, and urban viaducts because of their more rapid construction and lower deadweight compared with concrete decks, Orthotropic Steel Bridge Decks (OSBD) have been applied significantly. A typical OSBD consists of a deck plate supported by longitudinal ribs and transverse crossbeams in respective perpendicular directions, with asphalt surfacing normally applied on the deck plate to provide a waterproof surface layer for vehicles to travel on. Longitudinal ribs (open and closed) of two basic types are normally used in OSBDs. However, numerous fatigue cracks have been observed in OSBDs that have been in service over a long period of time, and such fatigue cracks around the rib-to-deck (RD) joint are the most important because they can potentially result in asphalt surface damage and steel corrosion.

In this keynote lecture, the mechanism of typical fatigue cracks in RD joints with closed ribs such as Type 1 initiating from the weld toe and propagating to the deck plate, Type 2 from the weld root to the deck plate, Type 3 from the weld toe to the rib wall, and Type 4 from the weld root to the weld throat are discussed at first. Secondly, it is also introduced that the current design procedure the S-N curves are most widely used to evaluate the fatigue life of weld joints based on the stresses around weld joints. It is very important to improve fatigue resistance as well as to develop repairing method of the fatigue cracks. Finally, since these cracks are difficult to observe until they have grown through the deck plate or weld throat, the nondestructive methods to detect fatigue cracks in-situ and its monitoring methods will be assessed.

## Brief Biography

Prof. Kunitomo Sugiura is the chair of Structural Mechanics Division of Department of Civil and Earth Resources Engineering, Graduate School of Engineering of Kyoto University since 2006. He received his Bachelor and Master of Science in Civil Engineering from the Faculty of Engineering at Nagoya University, and obtained his Doctor degree in Civil Engineering from the State University of New York at Buffalo in 1988. He is interested in various kinds of fundamental and applied technologies for civil infrastructures to be safe, secure and in harmony with the environment. In specific, with regard to steel, steel-concrete composite and FRP bridge structures, the load carrying and degrading mechanism, the performance evaluation, the rational and life-cycle design in conjunction with health monitoring are studied.