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### Application of Japanese high-performance steel SBHS500 to girder

In 2008, high performance steels were registered in JIS (Japanese Industrial Standards): SBHS500 and SBHS700. They are high strength steels developed specifically for bridge construction. In addition to high yield strength, they have various advantages such as good weld-ability over conventional steels. Therefore, they are known as high-performance steels. Focusing on the high yield strength, the present study explores a possibility of SBHS500. To this end, the maximum width-to-thickness ratios for compact I-shaped sections are first obtained for various yield strengths and shapes by nonlinear analysis. These maximum width-to-thickness ratios are quite different from those in AASHTO (American Association of State Highway and Transportation Officials). The present study further investigates the cause for the difference, which turns out to be attributable to difference in initial imperfection and stress-strain relationship. Then, two homogeneous sections and one hybrid section were considered. The homogeneous sections were made of SM490Y and SBHS500, respectively, and the hybrid section was of SM490Y for a web and SBHS500 for flanges. SM490Y is a conventional steel specified in JIS. The three sections were designed for a given plastic moment. The design of each cross section was carried out so as to minimize the weight. The homogeneous section of SBHS500 was found to be the lightest: 19% less than the weight of the homogeneous SM490Y section. Yet the price varies from steel to steel. From the viewpoint of material cost at the moment, the hybrid section turns out to be the most competitive.

### Biography

Eiki Yamaguchi has earned PhD at Purdue University, USA. He is currently Vice President and Professor at Department of Civil Engineering, Kyushu Institute of Technology, Japan. He has published more than 100 papers and serves as an Editorial Board Member of *Journal of Constructional Steel Research* and Chief Editor of *Journal of Civil Engineering*, Japan Society of Civil Engineers, Division A1, among others.

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