

# Vehicle-bridge interaction dynamics and vehicle scanning method for bridges

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## Abstract of presentation

This presentation provides some key contributions made by the speaker and co-workers since the 1990s. The starting point is the AASHTO (1992) impact formula used to account for the vehicle loads on bridges, which lacks clear physical meaning. To resolve this, effort was made by considering the vehicle-bridge interaction (VBI), the first time ever, and by employing the VBI element derived (Yang and Lin 1995) to establish a new set of physically meaningful impact formulas for bridges (Yang et al. 1995). Next, optimal design rule was firstly proposed for the design of simple beams commonly used in highspeed railways, in that the vibration of the beam will reach the minimum if it has a length equal to 1.5 times of the vehicle length (Yang et al. 1997). Such a rule was globally recognized by engineers in highspeed railways in countries including Europe, China, Japan, and Korea. Inspired by the works on VBI, a moving test vehicle was firstly proposed for scanning the frequencies of bridges (Yang et al. 2004). Such an indirect approach was verified to be feasible in the field test (Lin and Yang 2005) and renamed as the vehicle scanning method (VSM) (Yang et al. 2019). It was also extended to detection of mode shapes (Yang et al. 2014) and other properties of bridges. Recently, the vehicle-bridge contact response was used instead to avoid vehicle's self disturbance (Yang et al. 2018). Field tests were conducted in a number of bridges in Taipei, Chongqing, and Xiamen.

## References

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