



**THE SOCIETY FOR EARTHQUAKE AND CIVIL
ENGINEERING DYNAMICS**

AN ASSOCIATED SOCIETY OF THE INSTITUTION OF CIVIL ENGINEERS

EVENING MEETING

AT

INSTITUTION OF CIVIL ENGINEERS

ON

WEDNESDAY 29TH OCTOBER 2014, 6PM

**Investigating the Effects of Critical
Velocity on the Behaviour of Railway
Track at High-Speed**

Speaker:

Peter Woodward, Heriot-Watt University, Edinburgh

Chaired by:

Andreas Nielsen
Jacobs

Synopsis Overleaf

NON-MEMBERS OF THE SOCIETY ARE WELCOME TO ATTEND

Please note that there is no charge to attend.

Seats are allocated on a first come, first served basis.

For further information please contact Greg James, Associated Societies Executive
Institution of Civil Engineers, **Tel:** 020 7665 2229 or **Email:** greg.james@ice.org.uk

Visit the SECED website at <http://www.seced.org.uk>

Synopsis

Professor Peter Woodward will be talking about the development of critical velocity effects for high speed trains over poor soils. The talk will look at the Ledsgard site in Sweden and will show how the critical velocity effect developed with train speed and what the effect was on the track response. The site is analysed using the dynamic fully coupled 3-dimensional non-linear time domain finite element program DART3D and comparisons to the measured response made. The formation of ground Mach Cones as the train speed increases is clearly shown through displaced contour plots of the track response; this is compared to video evidence of ground wave propagation at the site. The development of lateral ground vibration is also discussed through plots of the vertical peak ground velocity. Observations about the peak strains within the soil are presented in relation to the development of non-linear effects and guidance on the analysis methodology given. The research work is put into context for the development of high-speed lines across the world and the implications for ground reinforcement to allow line speed increases discussed.

Speaker

Prof Peter Woodward

Peter Woodward is the Atkins Professor of High Speed Railways and Director of the Institute for Infrastructure & Environment at Heriot-Watt University. He is a Fellow of the Institution of Civil Engineers, a Chartered Engineer and founding member of the Rail Systems Advanced Research Centre (RSARC). He was seconded part-time to the railway industry between 2001-2010 as a company Technical Director. He has been the Principal Investigator on many research grants, including the Development of Design Guidelines for High-Speed Railways and Technology Strategy Board projects for Rail Innovation. He invented a unique patented railway track reinforcement system (XiTRACK) that has been used across the UK and overseas. This technique received the Highly Commended Award in the Innovation of the Year category at the National Rail Awards 2005 and the Institution of Civil Engineers Webb Prize, 2008. He has won many other awards, including the UK's Young Engineer Award. He has been invited to give Workshops and Keynote addresses at major international conferences across the world on railway track geo-dynamics at high-speed, transitions and track reinforcement. He is the organiser (in collaboration with SNCF and UIC) of the International Workshops on Railway Track Science & Engineering. He will also be the organiser for the upcoming International UK-Japan railways workshop at Heriot-Watt University (October 2014). He is a consultant to the railway industry, particularly on high speed ground dynamics and has built the UK largest laboratory based railway test track facility. He has published over 120 research papers and regularly gives press and TV interviews on railway track engineering. He was selected by The Royal Society to present his work in high-speed at the upcoming Royal Society Summer Science Festival 2014 in collaboration with Atkins, Laing O'Rourke and High Speed 2.