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The Tenth Mallet–Milne Lecture

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The biennial Mallet–Milne Lectures were began by the Society for Earthquake and Civil Engineering Dynamics (SECED) in 1987 in honour of Robert Mallet (1810–1881) and John Milne (1850–1913), the nineteenth century pioneers of seismology in Britain, who made fundamental contributions to the observation and understanding of earthquakes. The prestige lectures are given by international recognised experts in the field of earthquake engineering on topics close to their own professional interests but also of relevance to the broader earthquake engineering community. The Mallet–Milne Lectures have covered many different aspects of earthquake engineering primarily from a technical perspective including the broader issues of policy for disaster prevention.

Three of the Lectures in the series have been dedicated to issues relating to engineering seismology and seismic hazard assessment. In the First Mallet–Milne Lecture 'Engineering Seismology', Prof. Nicholas Ambraseys of Imperial College, London described a new approach to the assessment of liquefaction potential and a re-evaluation of twentieth century seismicity in Turkey. In the Fifth Mallet–Milne Lecture 'From Earthquake Acceleration to Seismic Displacement' by Prof. Bruce Bolt of the University of California at Berkeley focussed on the destructive nature of near field ground motions containing high energy pulses that are usually referred to as "fling" – a term the lecturer himself was responsible for coining. In the Eighth Mallet–Milne Lecture 'Living with Earthquakes: Know your Faults', Dr James Jackson of Cambridge University addressed the identification and characterisation of active geological faults. Dr Jackson illustrated the major advances made in the ability of seismologists to determine source parameters for earthquakes, in the understanding of the relationship between crustal deformations and geomorphology and in the developments or remote technology that allow rapid and accurate measurements of deformation of the Earth's surface.

The other six Mallet–Milne Lectures have considered how the seismic community may use technical knowledge, model testing and common sense

to ensure appropriate design. In the Second Mallet–Milne Lecture, by George Housner of the California Institute of Technology, dealt with policy and planning issues. The lecture showed how reconciliation and structural response prediction can help us 'Cope with natural disasters', and sign-posted the way ahead for the start of the Unity Nations International Decade for Natural Disaster Reduction. In the Third Mallet–Milne Lecture Geoffrey Warburton, of the University of Nottingham, showed in his lecture on the 'Reduction of Vibrations' how the hazard, and hence risk, can be mitigated by engineering intervention. The application of seismic base isolation techniques, and other vibration absorption methods, is becoming an increasingly more commonplace option for earthquake resistant design. Tom Paulay of the University of Canterbury delivered the Fourth Mallet–Milne Lecture entitled 'Simplicity and Confidence in Seismic Design'. He used his extensive design experience to address concepts that can be employed to ensure that reinforced concrete buildings can be expected to perform, in Prof. Paulay's words, "as they were told to". The issue of expected and actual behaviour of buildings and bridges was revisited Sixth Mallet–Milne Lecture. Prof. Roy Severn of the University of Bristol presented 'Structural Response Prediction Using Experimental Data' drawing on his lifetime experience in the dynamic testing of large structures around the world and the application of the results to earthquake engineering. Prof. Cinna Lomnitz of the National Autonomous University of Mexico gave the Seventh Mallet-Milne Lecture entitled 'The Road to Total Earthquake Safety', in which he addressed the dynamics of seismic wave propagation, the response of soft soils and the coupling of the ground motion with structural response. In the Ninth Mallet–Milne Lecture Nigel Priestly, Emeritus Professor of Structural Engineering at the University of California at San Diego and co-director of the Rose School, Italy, presented 'Revisiting Myths and Fallacies in Earthquake Engineering'. In the lecture he showed how a number of common design principles are inappropriate and he outlined a simple and rational seismic design procedure based on displacement rather than strength considerations.

In the Tenth Mallet–Milne Lecture, W. D. Liam Finn, Anabuki Professor of Foundation Geodynamics, Kagawa University, Japan and Prof. Emeritus, University of British Columbia, Canada, presents 'A Study of Piles during Earthquakes: Issues of Design and Analysis'. Prof. Finn is currently working on a major research project funded by the Anabuki Construction Company, Japan on the seismic response of large diameter cast in place concrete piles in reclaimed land in which liquefaction effects are a major problem. The paper presents a critical overview of engineering practice for evaluating the response of pile foundations during earthquakes, based on his current research. Some of the key findings from the study include: the relative effects of inertial and kinematic interaction on acceleration and

displacement spectra; a method for estimating whether inertial interaction is likely to be important or not in a given situation and so when a structure may be treated as a fixed based structure for estimating inertial loads; a method for representing reliably the time-dependent pile cap stiffness values by effective single value stiffness values based on simple analysis; the occurrence of large kinematic moments when a liquefied layer or naturally occurring soft layer is sandwiched between two hard layers; and the role of rotational stiffness in controlling pile head displacements, especially in liquefiable soils.

Prof. Finn has been a leading force in the development of geotechnical earthquake engineering over the last 40 years. He graduated from the National University of Ireland in 1954 with a B.Eng. in Civil Engineering. He got his M.Sc. and Ph.D. from the University of Washington in Seattle in 1957 and 1960, respectively. After the 1964 Niigata Earthquake, he began to specialize in Geotechnical Earthquake Engineering and started the first program in Canada at the University of British Columbia in Vancouver where he was Head of Civil Engineering and Dean of Applied Science. In 1999, he was appointed as the first Anabuki Professor of Foundation Geodynamics at Kagawa University, Takamatsu, Japan. He has published over 300 papers on topics including liquefaction, seismic response of sites and earth structures, seismic safety evaluation of dams, seismic response of pile foundations and seismic risk.

SECED are delighted that the Editors of the Bulletin of Earthquake Engineering have agreed to publish the paper in its entirety in this special issue and we extend our gratitude to Kluwer for their support of this initiative. We trust that this paper will bring the Tenth Mallet–Milne Lecture to many interested individuals who could not attend the formal presentation of the lecture in London on 25 May 2005. Together with the previous Mallet–Milne Lectures we are confident that this will be a valuable resource to earthquake engineers for years to come.