

# EUROMECH 401 INVERSE METHODS IN STRUCTURAL DYNAMICS

Liverpool 6-8 September 1999

Keynote presentations were given by Professors G M L Gladwell (Waterloo, Canada) and S G Braun (Technion). Seventeen different countries were represented on the delegate list including the USA (3-delegates) and Australia (3-delegates). 42 Papers were presented in 13 sessions including 2 parallel sessions on the second day. Selected papers appeared in a special issue of *Mechanical Systems and Signal Processing* (15(1), 2001).

The subject of inverse methods is widely understood in Mathematics to be a sub-domain of linear algebra, such as the classical inverse eigenvalue problem. The boundaries of the engineering discipline that we might call Inverse Methods in Structural Dynamics are not defined very clearly but might be considered to enclose such areas as system identification, finite-element model updating, damage detection and structural modification. These were the dominant themes of the Colloquium.

The reconstruction of stiffness and mass terms from spectra and modes was considered in two papers (G M L Gladwell; Y M Ram). Model updating methods were described (C Zang and M Imregun; M Reynier; J L Beck; S Keye; R Kenigsbuch and Y Halevi; C Mares, J E Mottershead and M I Friswell; A Chouaki, A Deraemaeker and P Ladaveze; M Zehn and G Schmidt; and W D'Ambrogio and A Fregolent) and the identification of nonlinear systems (J-C Golinval; C Meskell and J A Fitzpatrick; S Meyer). Several papers were presented on inverse methods for damage detection (L Mevel; H Gergenci and B Horton; N Stubbs and S Choi; K Worden; I Trendafilova, H Van Brussel and P Sas; J De Visscher, W P De Wilde, B Peeters, J Maeck, G De Roeck, J M Ndambi and J Vantomme; M P Whelan; F Vestroni and D Cappacchi; H Sol, J De Visscher and W P De Wilde). The inverse eigenvalue problem was addressed (Starek), and more specific eigenvalue problems were considered (U Prells and M I Friswell; Li and He). Methods for assigning natural frequencies and normal modes of structures by passive modifications were presented (S G Braun, J E Mottershead and C Mares) as was the problem of determining damping in structures (G Tomlinson). Several papers dealt with issues of signal processing (C Valente and D Spina; S D Fassois and G N Fouskitakis; S Cogan, J P Lombard and C Berthod) and particularly for frequency response data (O'Callaghan and Avitabile; and N M Maia, J M M Silva and A M Ribeiro). Other topics included Geometric Algebra (S D Garvey, M I Friswell and Y Vershinin), the value of knowledge (Y Ben-Haim), boundary-condition identification (H Ahmadian, J E Mottershead and M I Friswell), rotor dynamics (A W Lees), energy

~~flow~~ (M W Dobry), traffic-excited bridges (B A D Piombo, E Giocelli, A Fasana  
and S Sorrentino) and force identification (A Fregolent).

**John E Mottershead (Liverpool)**

**Michael I Friswell (Swansea)**

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