Professor Kostas P. Soldatos, CMath FIMA Csci

See:
http://www.maths.nottingham.ac.uk/personal/kps/
http://www.macsinet.org/ifexpert/myPage.jsp?ksoldatos
http://www.nottingham.ac.uk/mathematics/people/kostas.soldatos
http://www.aipuniphy.org/Profile.bme/234158/Kostas_P_Soldatos

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Research Interests:

My research activity is in the field of Theoretical Solid Mechanics and is documented in the reasonably large number of high quality publications listed below. These reveal an interdisciplinary nature of research interests on mathematical modelling and analysis of Solids and Structures with applications in Mathematical, Material, Engineering and Physical Sciences. The strong influence of this activity is reflected into the rapidly growing number of citations (currently over seven hundred) received from other researchers. I have given invited research seminars and talks in Universities and research Institutes of ten different countries (Canada, China, Cyprus, Germany, Greece, Italy, Japan, Switzerland, UK and USA).

Typical research projects that attract my interest are related with the following interconnected areas:

1. Mathematical modelling of the behaviour of thin walled structures and structural components in terms of high-order, linear or non-linear, ordinary and partial differential equations;
2. Equivalence of variational and vectorial methods available for relevant mathematical modelling;
3. Analytical, semi-analytical and numerical techniques for solving relevant differential equations (e.g., complex variable and asymptotic analysis techniques, iterative and successive approximation methods, Rayleigh-Ritz and Galerkin methods, finite element techniques);
4. Studies on stress analysis of, static (small and large deflections) and dynamic (vibration and wave propagation) analysis of, thermoelastic and piezo-electric modelling and analysis of homogeneous and inhomogeneous highly reinforced solid structures and structural components;
5. Theoretical material characterisation.

A brief outline and rough classification of major research findings and contributions are as follows:

1. Unification and generalised formulation of the most commonly used beam [33, 49], plate [37, 46, 48, 51] and shell theories [35, 47, 64, 66]. Apart the independent research standing and merit of such generalisations, these assisted considerably the developments described in the first couple of the research areas that follow.

2. A new "vectorial" approach [37, 48, 49, 63] appropriate for variationally consistent formulation of higher-order beam and plate theories. Though simpler in use, this is equivalent to corresponding variational approaches while, in the case of classical and first-order theories, it reduces to the well-known, conventional "vectorial" approach. Its possible extension towards corresponding "vectorial" formulation(s) of curved component (shell-type) theories remains still an open problem for further investigation [43].

3. A new, theoretical, stress analysis method for structural components and component assemblies [28, 29, 33]. This has already shown enormous potential in dealing with many different aspects of the mechanics of homogeneous and composite thin-walled structures [1, 8, 11, 13, 14, 17-19, 22], including de-lamination modelling [13, 14, 17] and the assessment of relevant, conventional beam and plate theories [8, 11]. It also shows great potential in improving the efficiency and reliability of existing mathematical/numerical algorithms and relevant computational codes [10]. The method has been the basis of the six invited CISM lectures [81], as well as the subject of several recent invited seminars and talks. Substantial relevant future developments are now facilitated by the analytical elucidation [59] of the success of

4. a semi-analytical, successive approximation method (SAM) proposed in [60]. This has been used afterwards, from groups based both in Nottingham [31, 34, 36, 38-40, 42, 44, 45, 52, 86-88, 91], and elsewhere, for the study of the mechanics of curved structural components. After [9], this SAM can be classified among exact mathematical methods with multiple target applications in research areas of Solid Mechanics. It is also worth exploring its usefulness and applicability in solving differential equations with variable coefficients that may occur in other areas of Mathematical Sciences, Physics and Engineering.

5. Thorough and comprehensive review studies [25, 41] of specific research subjects in vibrations of continuous systems, with the purpose to tailor together all relevant literature knowledge and, hence, to ease, assist and influence future research developments in those subjects. It is mentioned that

6. vibration studies of continuous systems are among my very early research study subjects in Mechanics [32, 70, 99], with substantial subsequent (e.g., [31, 34-36, 40, 52, 58, 60, 62, 64]) and more recent relevant dynamics contributions (e.g., [12, 15, 16, 20, 24, 27]). Considerable number of relevant contributions are also published in the areas of

7. stability (e.g., [3, 4, 39, 44, 53-55, 96]) and thermo-elastic analysis [1, 38, 44, 82] of homogeneous and composite structural components.

8. a mathematical analogy established between the evolution of stochastic "continuous time Markov systems" and the dynamic theory of anisotropic elasticity [7, 84];

9. the complex potential (Stroh-type) formalism of the partial differential equations associated with refined, higher-order, plate and shell theories [5, 6],

10. Theory and applications of classical and finite elasticity [2-4].

The three- and two-dimensional Solid Mechanics models as well as the analysis methods used in my studies apply to whole classes of so-called smart and/or functionally graded materials and structures as well as to similar (modern) kinds of thin-walled structural components and component assemblies having varieties of geometric and/or material combination properties.

Additional Information:

I am a Fellow (FIMA) of the Institute of Mathematics and its Applications (IMA) with Chartered Mathematician (CMath) and Chartered Scientist (CSci) statuses. In this connection, I was recently invited and agreed to lend my expertise to the IMA Programme Approval Scheme (approval of Higher Education courses that meet the CMath status criteria).

I am also a Member of:
the European Mechanics Society (Euromech);
the American Society of Mechanical Engineers International (ASME International);
the executive committee (currently Secretary) of the _UK & Ireland Chapter _ of ASME International;
the Nottingham University Composites Club (NUCC); and
the Hellenic Society of Theoretical and Applied Mechanics (HSTAM);
the American Institute of Aeronautics and Astronautics (AIAA).

My biography is listed in editions of:
Who's Who in Computational Science and Engineering (2005);
the Marquis Who's Who in the World (1997, 2002 & 2006);
the Cambridge Archives of the International Biographical Centre (Men of Achievement, 1996);
the Marquis Who's Who in Science and Engineering (1994/95);

I have been a member of the Editorial Board of Composites Engineering (later re-named as Composites B: Engineering) while I currently serve in the Editorial board of the Mechanics of Advanced Materials and Structures.

Hobbies:

I have always enjoyed all kinds of sports, being in the past a keen football and basketball player (also a qualified basketball referee). Today I enjoy indoor swimming on a regular (almost daily) basis while, occasionally, I take long (over 10 miles) walks.

LIST OF PUBLICATIONS (see www.maths.nottingham.ac.uk/personal/kps/)