……………………

Edited by:

A. Öchsner, L. Silva and H. Altenbach

ABSTRACT BOOK

ACE-X 2009 • ROME - ITALY

22-23 JUNE, 2009

www.acex-2009.com

Young Scientist Awards Sponsored by:

Affiliated Institution:

Springer the language of science

IRONIX GLOBAL EVENTS CONSULTING

IRONIX CONFERENCES MANAGEMENT

ironix-conferences.com

we organise conferences!

Italian Association for Stress Analysis
Working Group on Joining Techniques

There is a growing interest in use of thermal spray coating as a suitable technique to apply protective layers on the surface of engineering materials. Thermal spraying is a general term for a group of coating techniques which deposit various materials available in powder or wire forms as molten or semi-molten particles onto the surface of a substrate [1]. A large choice of coating materials, including metals, alloys, ceramics, and carbides can be deposited using this method. Enhanced thermo-mechanical surface properties by coating are crucial in the design of turbine airfoils, next generation of aerospace applications, energy production, gas turbines, combustion engines, oil industry, electronics, automotive, printing and many other high-tech industries.

Generally, performing experimental tests to measure thermo-mechanical properties of the freestanding coating samples is hard due to the difficulty of separation of such a thin coatings (50- 500 μm) from substrate and preparation of sub size test samples. It is generally believed that the microstructural features will define thermo-mechanical properties of the coatings [2]. The coating microstructure may differ from those resulting from conventional processing routes and exhibit a layered type of structure including porosities, and micro-voids. An image based computational study focused on the microstructure features for interpretation of the mechanical and physical properties of the coating is presented. This multiscale computational scheme provides essential findings in coating and interface improvements and contributes to new horizons in material characterization. Multiscale material characteristics formulation is a new and demanded feature in modern material characterization. The proposed research work will pave the way for further understanding of coatings and interfacial material characteristics. To this end, superalloy and ceramic coatings will be examined for such experimental-computational study.

[1] L. Pawlowski, Thermal Spray Coatings, John Wiley & Sons, New York, 2008.
[2] P. Fauchais, Understanding Plasma Spraying, Institute of Physics Publishing, Journal of
Physics D, 37, pp. 086–108, 2004.

………..

ACEX223

Dr. Masoud Tahani
Masoud Tahani, Ph.D., Associate Professor
Department of Mechanical Engineering,
Faculty of Engineering
Ferdowsi University of Mashhad
P.O.Box 91775-1111, Mashhad, Iran

Analysis of Dynamic Interlaminar Stresses in Antisymmetric Angle-ply Composite Laminated Plates

S. Gheybi, M. Tahani
Department of Mechanical Engineering, Faculty of Engineering, Ferdowsi University of Mashhad, Mashhad, Iran

One of the main causes of failure of composite laminated structures is delamination damage, which is significantly derived from interlaminar stresses [1]. Analytical solution of a first-order shear deformation theory is developed to study interlaminar stresses of antisymmetric angle-ply laminated rectangular plates subjected to forced vibration. In the theoretical formulations the effects of all the rotational inertia terms are considered. Also the change in the plate thickness is taken into account due to its important role in the edge effects. The governing equations of laminated plates are established by applying Hamilton's principle and are solved by using Levy's solution method. It is assumed that the plates have two simply supported opposite edges and the remaining boundary conditions are arbitrary. The functions of displacement components are obtained using the results of free vibration, which are obtained by solving the homogeneous form of equations of motion analytically using the state-space approach. Also the function of time is obtained using orthogonality relation, the Laplace transform and convolution integral.

First the natural frequencies and mode shapes for the case of free vibration and the time responses for the case of transient vibration are obtained and then dynamic interlaminar stresses are determined by integrating the three-dimensional local equations of motion and imposing given boundary conditions at the top or bottom surface of the laminate. The accuracy and effectiveness of the first-order theory in describing the localized three-dimensional effects are demonstrated by comparing the results of the present theory with those obtained from finite element method. Numerical results show that boundary conditions, configurations, E1/E2 ratio, side-to-thickness ratio and aspect ratio have significant effect on dynamic interlaminar stresses.

[1] X. Wang, Y.X. Wang and H.K. Yang, Dynamic interlaminar stresses in laminated plates with simply and fixed supports, subjected to free vibrations and thermal load, Compo. Struct., 68, 139-145 (2005).

SPECIAL SESSION IN 'BIOMECHANICS'

ORAGANISED by:

http://faculty.ksu.edu.sa/Darwish/default.aspx

PROF. SAIED DARWISH
King Saud University, College of Engineering,
Industrial Engineering Department
Saudi Arabia

PUBLICATION:
Selected papers will be published in a special issue of the:

International Journal of Nano and Biomaterials (IJNBM)
(http://www.inderscience.com/)

ACEX029
Prof. M. Samir TULEIMAT