



Professor Sundararajan Natarajan

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Department of Mechanical Engineering
Indian Institute of Technology Madras, India

Biography:

Sundararajan Natarajan (Sundar) joined Machine Design Section, Department of Mechanical Engineering, Indian Institute of Technology-Madras as an Assistant Professor in 2014. Prior to this, Sundar held Postdoctoral Research Fellowship positions in the School of Civil and Environmental Engineering, The University of New South Wales, Sydney, Australia (2012-2014) and in the Department of Aerospace Engineering, Indian Institute of Science, Bangalore, India (2011-2012). Sundar received his PhD from the Institute of Mechanics and Advanced Materials, Cardiff School of Engineering, Cardiff University, Wales, UK, under the supervision of Prof. Stéphanie PA Bordas and Dr. Pierre Kerfriden. Between 2003 and 2008, Sundar was working in the rotating parts center of excellence, GE-Aviation, India Technology Centre, Bangalore India. Sundar graduated with Bachelors in Engineering (Mechanical) from Bharthiar University in 1999. Sundar was awarded Zienkiewicz Best PhD Prize by the Association of Computational Mechanics in Engineering, UK in 2011 for his PhD thesis entitled "Enriched finite element methods: Advances & Applications". Sundar is a recipient of

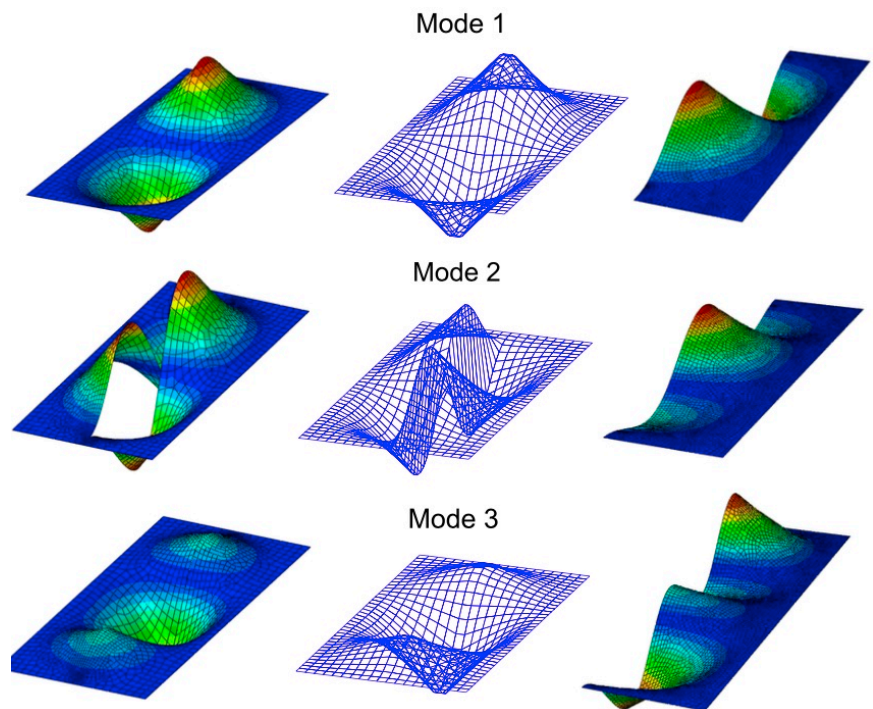


Figure 17. Buckling modes of clamped centre cracked ($c/a = 0.9$) rectangular plates

From: P. Baiz, S. Natarajan, S. Bordas, P. Kerfriden, T. Rabczuk, Linear buckling analysis of cracked plates by SFEM and XFEM, J Mech Mater Struct, 6 (2011), pp. 1213–1238

Overseas Research Students Awards Scheme and has been awarded Best student paper in the Numerical Analysis Conference held in Edinburgh, UK in 2009.

Research Interests:

Computational mechanics, XFEM, meshfree methods, virtual element method, composite materials, functionally graded materials, moving boundary problems

Selected Publications:

- Bordas, S. P. A., Rabczuk, T., Nguyen-Xuan, H., Nguyen, V. P., Natarajan, S., Bog, T., Minh, Q. D., and Nguyen-Vinh, H. (2008a). "On strain smoothing in FEM and XFEM." *Computers and Structures*, doi:10.1016/j.compstruc.2008.07.006
- Bordas, S., Natarajan, S.: On the approximation in the smoothed finite element method (SFEM). *Int. J. Numer. Methods Eng.* 81, 660–670 (2010)
- P. Baiz, S. Natarajan, S. Bordas, P. Kerfriden, T. Rabczuk, Linear buckling analysis of cracked plates by SFEM and XFEM, *J Mech Mater Struct*, 6 (2011), pp. 1213–1238
- Natarajan, S., Baiz, P. M., Ganapathi, M., Kerfriden, P. and Bordas, S., Linear Free Flexural Vibration of Cracked Functionally Graded Plates in Thermal Environment. *Computers and Structures*, 89: 1535–1546, 2011
- Natarajan S, Baiz P M, Bordas S, Rabczuk T, Kerfriden P. Natural frequencies of cracked functionally graded material plates by the extended finite element method. *Composite Structures*, 2011, 93(11): 3082–3092
- Natarajan S, Chakraborty S, Thangavel M, Bordas S, Rabczuk T. Size dependent free flexural vibration behavior of functionally graded nanoplates. *Computational Materials Science*, 2012, 65: 74–80
- S. Natarajan and Ganapathi Manickam, "Bending and vibration of functionally graded material sandwich plates using an accurate theory", *Finite Elements in Analysis and Design*, Vol. 57, pp 32-42, September 2012
- Valizadeh N, Natarajan S, Gonzalez-Estrada O A, Rabczuk T, Bui T Q, Bordas S P A. NURBS-based finite element analysis of functionally graded plates: static bending, vibration, buckling and flutter. *Composite Structures*, 2013, 99: 309–326
- Sundararajan Natarajan, Pratik S. Deogekar, Ganapathi Manickam, Salim Belouettar, "Hygrothermal effects on free vibration and buckling of laminated composites with cutouts", *Composite Structures*, 108:848-855, February 2014
- S. Natarajan and Ganapathi Manickam, "Bending and vibration of functionally graded material sandwich plates using an accurate theory", *Finite Elements in Analysis and Design*, Vol. 57, pp 32-42, September 2012
- J.D. Rodrigues, S. Natarajan, A.J.M. Ferreira, E. Carrera, M. Cinefra and S.P.A. Bordas, "Analysis of composite plates through cell-based smoothed finite element and 4-noded mixed interpolation of tensorial components techniques", *Computers & Structures*, Vol. 135, pp 83-87, April 2014
- S. Natarajan, S. Chakraborty, M. Ganapathi, M. Subramanian, A parametric study on the buckling of functionally graded material plates with internal discontinuities using the partition of unity method, *Eur J Mech A/Solids*, 44 (2014), pp. 136–147
- Sundararajan Natarajan, Mohamed Haboussi and Ganapathi Manickam, "Application of higher-order structural theory to bending and free vibration analysis of sandwich plates with CNT reinforced composite facesheets", *Composite Structures*, Vol. 113, pp 197-207, July 2014
- A. Sankar, S. Natarajan, T. Ben Zineb and M. Ganapathi, "Investigation of supersonic flutter of thick doubly curved sandwich panels with CNT reinforced facesheets using higher-order structural theory", *Composite Structures*, Vol. 127, pp 340-355, September 2015
- Anand Venkatachari, Sundararajan Natarajan, Manickam Ganapathi and Mohamed Haboussi, "Mechanical buckling of curvilinear fibre composite laminate with material discontinuities and environmental effects", *Composite Structures*, Vol. 131, pp 790-798, November 2015

Sundararajan Natarajan, Stephane P.A. Bordas and Ean Tat Ooi, "Virtual and smoothed finite elements: A connection and its application to polygonal/polyhedral finite element methods", *International Journal for Numerical Methods in Engineering*, Vol. 104, No. 13, pp 1173-1199, December 2015

Anand Venkatachari, Sundararajan Natarajan, Mohamed Haboussi and Manickam Ganapathi, "Environmental effects on the free vibration of curvilinear fibre composite laminates with cutouts", *Composites Part B: Engineering*, Vol. 88, pp 131-138, March 2016

A. Sankar, S. Natarajan, M. Ganapathi, Dynamic instability analysis of sandwich plates with CNT reinforced facesheets, *Compos. Struct.*, 146 (2016), pp. 187–200

A.L.N. Pramod (1), S. Natarajan (1), A.J.M. Ferreira (2), E. Carrera (3) and M. Cinefra "Static and free vibration analysis of cross-ply laminated plates using the Reissner-mixed variational theorem and the cell based smoothed finite element method", *European Journal of Mechanics – A/Solids*, Vol. 62, pp 14-21, March-April 2017

F.D. Marques, S. Natarajan and A.J.M. Ferreira, "Evolutionary-based aeroelastic tailoring of stiffened laminated composite panels in supersonic flow regime", *Composite Structures*, Vol. 167, pp 30-37, May 2017