

# CURRICULUM VITAE

## Hamid Ahmadian



### 1. Personal Details

Dr Hamid Ahmadian BSc, MSc, PhD.

Date of Birth: DEC. 22, 1960

Present Post: Faculty Member, Faculty of Mechanical Engineering,  
Iran University of Science and Technology,

### 2. Higher Education

- **Ph.D.**, Mechanical Engineering,  
*Thesis Title:* "Dynamical Model Identification Using Modal Testing Data", *Supervisors:*  
G.M.L. Gladwell, and F. Ismail. University of Waterloo, Canada, 1994.
- **M.Sc.**, Mechanical Engineering,  
*Thesis Title:* "Dynamic Analysis of Shells on Elastic Foundations", *Supervisor:* Dr. M.R.  
Islami, AmirKabir University. Teheran, Iran, 1988.
- **B.Sc.**, Mechanical Engineering, Iran University of Science and Technology,  
Teheran, Iran, 1986.

### 3. Academic Appointments

- 2007-
  - **Professor of Vibration Engineering** , Faculty of Mechanical Engineering,  
Iran University of Science and Technology, Teheran, Iran
- 2004-2006
  - **Head of Solid Mechanics Group**, Faculty of Mechanical Engineering,  
Iran University of Science and Technology, Teheran, Iran
- 2003-2007
  - **Associate Professor**, Faculty of Mechanical Engineering,  
Iran University of Science and Technology, Teheran, Iran
- 2002 – 2004
  - **Dean**, Faculty of Mechanical Engineering,  
Iran University of Science and Technology, Teheran, Iran
- Oct. 2001-
  - **Honorary Research Fellow**, Department of Engineering.  
Liverpool University, Liverpool, UK
- July 2001-  
Oct. 2001
  - **Visiting Fellow**, Department of Engineering.  
Liverpool University, Liverpool, UK

- June 2000-  
Jan. 2001
  - **Visiting Fellow**, Department of Engineering.  
Liverpool University, Liverpool, UK
  
- 1998-2001
  - **Deputy Dean**, Faculty of Mechanical Engineering,  
Iran University of Science and Technology, Teheran, Iran
  
- 1996 - 2003
  - **Assistant Professor**, Faculty of Mechanical Engineering,  
Iran University of Science and Technology, Teheran, Iran
  
- 1995-1996
  - **Research Associate**, Department of Mechanical Engineering.  
(Team Leader: JE Mottershead) Liverpool University, Liverpool, UK
  
- 1994-1995
  - **Research Associate**, Department of Mechanical Engineering.  
(Team Leader: JE Mottershead) University of Wales, Swansea, UK
  
- 1992-1994
  - **Research Assistant**, Department of Mechanical Engineering.  
University of Waterloo, Canada
  
- 1991-1994
  - **Teaching Assistant**, Department of Mechanical Engineering.  
University of Waterloo, Canada

#### 4. Teaching Experience

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|-------------------------|---|
| Courses Taught          | <ul style="list-style-type: none"> <li>▪ Sound and Vibration Measurement Systems, (2005- )</li> <li>▪ Modal Testing, Graduate Course, (1997- )</li> <li>▪ Advanced Vibration, Graduate Course, (1999- )</li> <li>▪ Structural Dynamics, Graduate Course, (1998- )</li> <li>▪ Machinery Vibration, Graduate Course, (2002- )</li> <li>▪ Mechanical Vibration, Undergraduate Course, (1996- )</li> <li>▪ Mechanism Design, Undergraduate Course, (1997- )</li> <li>▪ Machine Dynamics, Undergraduate Course, (1996-1999)</li> <li>▪ Engineering Mathematics, Undergraduate Course, (1994-1997)</li> </ul> |
| Ph.D. Theses Supervised | <ul style="list-style-type: none"> <li>▪ Modeling non-linear effects in mechanical joints due to micro-slip (H. Jalali)</li> <li>▪ Optimal sensor placement in modal tests using GSVD (H. Hadad)</li> <li>▪ Generic element models suitable for nonlinear joint modes (S.Faroghi)</li> </ul>  |

Masters Theses  
Supervised

- Investigation of flutter in a low aspect ratio wing (S. Farooghi)
- Investigating vibro-buckling behavior in beams with bolts joint interfaces (M. Sohrabian)
- Measurement of lateral vibration of rail vehicles for early detection of derailment (E. Danaee)
- Improving the convergence properties of in plane stress element by introduction of rotational DOFs (M. Mohamadi)
- A new formulation for symmetrical shell element by an inverse method (M. Zainali)
- Investigation the effect of slip between tool and holder in machinery vibration (Salahshoor)
- Experimental investigation on pyro-shock effects in staging mechanisms (Kazemian)
- A new model for rectangular plane stress element with minimum discretization error (D. Hossaini)
- On-line damage detection in rotors by measuring bearing support vibrations (M. Gholami)
- Identification of Rigid Body Modes from modal tests (B. Nakhjavani)
- Determination of stability lobes in milling using modal test data (M. Eslami)
- Fault detection in Gear-Boxes using measured vibrations (F. Parvizi)
- Estimating rigid body properties of an engine-gear-box assembly (H. Shahverdi)
- Bolted joint interface model identification (A. Sadeghi)
- Estimation of the buckling load using non-destructive vibro-buckling tests (H. Rahimi)
- Modeling microslip in bolted joint interfaces (H. Jalali)
- Identification of joint models in engine valve-trains (M. Sharavi)
- Identification of crack location in drill strings from measured vibration data (S. Nazari)
  
- Modeling Backlash in geared transmission systems (F. Rafieian)
- Measuring RB properties using vibration based methods: mass line method (M. Ebrahimi)
- Experimental investigation of flank wear effects on machining stability (K.Ahmadi)
- Identification of interaction forces between wheel and rail track using carbody vibration measurements (M. Teimouri)

## 5. Industrial Collaboration

- **Auto/Aerospace Industries**  
Using Modal Test results in the design process

Conducting Modal Tests in various projects

Applying experimental data in model updating

Development of large-scale FE models

- **Iran Petro-Chemical Industries**

Condition monitoring and fault detection of rotating machinery

Vibration suppression in machinery, piping, etc.

- **Iran Railway Research Center**

Developing a method to correlate lateral vibration of a rail vehicle to the derailment ratio

Onboard measuring of rail vehicle accelerations for early detection of possible derailment

- **Industrial Development Organization**

Damage detection in industrial structures

Applying experimental vibration results in predictive maintenance

## 6. Research Projects with Industry

- Determination of slip-stick behavior in mechanical joints
- Modeling spot welds and bolted joints using thin layer theory
- Physical realization of updated parameters
- Identification of mechanical joints models in the MACE structure.
- Modal tests on Rolls Royce PEGASUS engine case for finite element model validation.
- Identification of the moment of inertia tensor of a car engine using modal tests.
- Passive control of vibrations in an Electro-motor base plate using DVA.
- Estimating the derailment coefficient by measuring the lateral acceleration of a rail vehicle.
- Estimating the buckling load of a stiffened shell using modal test results.
- The effect of geometric tolerance on dynamical behavior of turbine blades

## 7. Refereeing for Journals

- Journal of Sound and Vibration
- Mechanical Systems and Signal Processing
- International Journal of Engineering Science

## 8. Statement of Research Interests

H. Ahmadian's research interests are Model Updating, Inverse Eigenvalue Problems, Structural Dynamics and Finite Element Modeling. His contributions on Model Updating, where measured modal test data is used to obtain a new estimate for the parameters of a FE model, include the development of a systematic approach in parameterizing the model by using *Generic Elements*. Model updating should enhance modeling capability rather than just reproduce the measured data therefore regularizing the set of equations involved in updating when they are ill-conditioned using constraints with physical meanings is also employed.

Physical interpretation of the updating parameters is another challenging problem for the analyst. The issue has been addressed by converting the updated models to a series of continuous governing equations. The physical meanings of the updated parameters are then extracted from these equations. This was result of a joint work with Prof. JE Mottershead and Prof. MI Friswell and funded by EPSRC.

In the finite element method, H. Ahmadian has originated an inverse strategy to formulate an element without the need to introduce any shape functions. In this method a parametric model for the element is developed. Then the parameters of the model are assigned by minimizing the discretization error in the FE formulation. The method is developed based on the demands of the automotive industries, BMW, and Peugeot-Citroen, to produce a FE model of a car body with a minimum number of degree of freedom for dynamical structural analysis.

H Ahmadian's current research projects include the application of inverse methods in identifying properties of mechanical joints. Joints have a strong influence on the dynamical behavior of structures; hence identification of their models is an important step in finite element modeling. In a project supported by EPSRC and AWE-Aldermaston, models for mechanical joint interfaces in a structure (MACE) consist of threaded joint and face-to-face contact joints are obtained using *thin layer interface theory*. Parameters of the interface layer are function of joint geometry and interface stresses and are obtained from experimental vibration results by an inverse method. The method has been applied in identifying other types of mechanical joint interfaces such as bolted joints and spot-welded joints with successful results. The modeling of macro- and micro-slip phenomenon in the mechanical joint interfaces at different level of excitation force and the induced damping due to joint interface friction are main concerns in aerospace industries and are currently under investigation.

## 9. Publications

### Journal Papers

- Hassan Jalali, **Hamid Ahmadian**, John E. Mottershead, "Identification of nonlinear bolted lap-joint parameters by force-state mapping", *International Journal of Solids and Structures* 44 (2007) 8087–8105
- K. Ahmadi, **H. Ahmadian**, "Modelling machine tool dynamics using a distributed parameter tool-holder joint interface", *International Journal of Machine Tools & Manufacture* 47 (2007) 1916–1928
- **Ahmadian, H.**, Jalali, H., "Generic Element Formulation for Modeling Bolted Lap Joints", *Mechanical Systems and Signal Processing*, 21 (2007) 2318–2334
- **Ahmadian, H.**, and Jalali, H., "Identification of Bolted Lap Joints Parameters in Assembled Structures ", *Mechanical Systems and Signal Processing*, 21 (2007) 1041–1050

- A. Khojeh, M. Ayat, and **H. Ahmadian**, "Investigating the crack effects on vibrational behaviour of a rotor using special element" , *International Journal of Engineering Science*,17 (5), 2007
- H. Jahed, **H. Ahmadian**, and H. Khoshnavaz, "Estimating the fatigue life of an aero-blade under dynamical loading" , *International Journal of Engineering Science*, Vol. 17 (5), 2007
- **Ahmadian, H.**, Mottershead, J.E., James, S., Friswell, M.I., and Reece, C.A., "Modeling and Updating of Large Surface-to-Surface Joints in the AWE-MACE Structure " , *Mechanical Systems and Signal Processing*, Available online 6 July 2005.
- **Ahmadian, H.**, and Jalali, H., "Identification of Structural Joint Model From Modal Test Results" , *International Journal of Engineering Science*, **15**(3). 171-182,2004.
- **Ahmadian, H.**, Mottershead, J.E., and Friswell, M.I., "Physical Realization of Generic Parameters in Updating", *Journal of Vibration and Acoustics*, **124**, 628-633, 2002.
- **Ahmadian, H.**, Mottershead, J.E., and Friswell, M.I., "Boundary Condition Identification By Solution of Characteristic Equations", *Journal of Sound and Vibration*, **247**(5), 755-763, 2001.
- Friswell, M.I., Mottershead, J.E., and **Ahmadian, H.**, "Finite Element Model Updating Using Experimental Test Data: Parameterization and Regularization", *Philosophical Transactions of the Royal Society of London, Series A*, **359**, pp. 169-186, 2001
- **Ahmadian, H.**, Mottershead, J.E., and Friswell, M.I., "Damage Detection Using Substructure Modes", *Journal of Inverse Problems in Engineering*. **8**,pp. 309-323, 2000.
- **Ahmadian, H.**, Mottershead, J.E., and Friswell, M.I., "Regularization Methods For Finite Element Model Updating", *Mechanical Systems and Signal Processing*, **12**(1), 47-64,1998.
- Friswell, M.I., Mottershead, J.E., and **Ahmadian, H.**, "Combining Subset Selection and Parameter Constrains in Model Updating", *Journal of Vibration and Acoustics*, **120**(4), 854-859, 1998.
- **Ahmadian, H.**, Friswell, M.I., and Mottershead, J.E., "Minimization of the Discretization Error in Mass and Stiffness Formulation by an Inverse Method", *International Journal for Numerical Methods in Engineering*, **41**,371-387,1998.

- **Ahmadian, H.**, Gladwell, G.M.L. and Ismail, F., "Parameter Selection Strategies in Finite Element Model Updating", *Journal of Vibration and Acoustics*, 119(1). 37-45,1997.
- Gladwell, G.M.L., and **Ahmadian, H.**, "Generic Element Matrices Suitable for Finite Element Model Updating", *Mechanical Systems and Signal Processing*, 9(6), 601-614, 1995.
- **Ahmadian, H.**, Gladwell, G.M.L. and Ismail, F., "Finite Element Model Updating Using Modal Data", *Journal of Sound and Vibration*, **172**(5), 675-669, 1994.
- **Ahmadian, H.**, Ismail, F., and Gladwell, G.M.L., "Acceptable Element Matrices for Finite Element Model Updating", *Proceeding of the Second International Symposium on Inverse Problems, ISIP'94*, Paris, France, 2-4 Nov. 1994.
- **Ahmadian, H.**, Gladwell, G.M.L. and Ismail, F., "Families of Finite Element Models for Updating Procedures", *12th International Modal Analysis Conference*, Honolulu, Hawaii, February 1994.
- Gladwell, G.M.L. and **Ahmadian, H.**, "Identification of Vibrating Structures from Incomplete and Noisy Modal Data", *14th Canadian Congress of Applied Mechanics*, Queen's University, Kingston, June 1993.
- **Ahmadian, H.**, Ismail, F. and Gladwell, G.M.L., "Analytical Model Adjustment Using Modal Testing Data", *11th International Modal Analysis Conference*, Kissmme, Florida, February 1993.
- Islami, M.R., **Ahmadian, H.** and Ayatollahi, M.R., "Static and Dynamic Finite Element Solution of Plate and Shells of Revolution on Elastic Foundation", *The 1990 ASME Pressure Vessels and Piping Conference*, Nashville, Tennessee, June 1990

## 10. References

Prof. JE. Mottershead, Department of Engineering, University of Liverpool, England, L69 3BX, email: [j.e.mottershead@liverpool.ac.uk](mailto:j.e.mottershead@liverpool.ac.uk).

Prof. GML Gladwell, Dept. of Civil Engineering, University of Waterloo, Waterloo, Canada, N2L 3G1. email: [ggladwel@engmail.uwaterloo.ca](mailto:ggladwel@engmail.uwaterloo.ca)

Prof. M.I. Friswell, Department of Aerospace Engineering, University of Bristol, England, BS8 1TR. email: [m.i.friswell@bristol.ac.uk](mailto:m.i.friswell@bristol.ac.uk)