

# Stanford

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## Adrian Lew

Professor of Mechanical Engineering

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### Bio

#### BIO

Prof. Lew's interests lie in the broad area of computational solid mechanics. He is concerned with the fundamental design and mathematical analysis of material models and numerical algorithms.

Currently the group is focused on the design of algorithms to simulate hydraulic fracturing. To this end we work on algorithms for time-integration embedded or immersed boundary methods.

#### ACADEMIC APPOINTMENTS

- Professor, Mechanical Engineering
- Member, Bio-X
- Member, Institute for Computational and Mathematical Engineering (ICME)

#### PROFESSIONAL EDUCATION

- PhD, Caltech , Mechanical Engineering (2003)

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### Teaching

#### COURSES

##### 2025-26

- Dynamics: ENGR 15 (Aut, Sum)
- Engineering Functional Analysis and Finite Elements: CME 356, ME 412 (Spr)
- Finite Element Analysis: ME 335A (Win)

##### 2024-25

- Finite Element Analysis: ME 335A (Win)

##### 2023-24

- Finite Element Analysis: ME 335A (Win)
- Intro to Solid Mechanics: ENGR 14 (Aut)
- Mechanical Analysis in Design: ME 329 (Spr)

##### 2022-23

- Dynamics: ENGR 15 (Aut)

- Finite Element Analysis: ME 335A (Spr)
- The Science and the Practice of Metal 3D Printing: ME 349 (Win)

## STANFORD ADVISEES

### Doctoral Dissertation Reader (AC)

Mingqi Shuai

### Doctoral Dissertation Advisor (AC)

Obed Camacho, José Hasbani

### Doctoral Dissertation Co-Advisor (AC)

Philip DePond

### Master's Program Advisor

Jerry Qu

### Doctoral (Program)

Sophie Leanza, EmJ Rennich

### Postdoctoral Research Mentor

Xinyi Qian

## Publications

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### PUBLICATIONS

- **A FAMILY OF DISCONTINUOUS GALERKIN MIXED METHODS FOR NEARLY AND PERFECTLY INCOMPRESSIBLE ELASTICITY** *ESAIM-MATHEMATICAL MODELLING AND NUMERICAL ANALYSIS-MODELISATION MATHÉMATIQUE ET ANALYSE NUMÉRIQUE*  
Shen, Y., Lew, A. J.  
2012; 46 (5): 1003-1028
- **An explicit asynchronous contact algorithm for elastic body-rigid wall interaction** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Ryckman, R. A., Lew, A. J.  
2012; 89 (7): 869-896
- **Adhesive Frictionless Contact Between an Elastic Isotropic Half-Space and a Rigid Axi-Symmetric Punch** *JOURNAL OF ELASTICITY*  
Kesari, H., Lew, A. J.  
2012; 106 (2): 203-224
- **Time integrators based on approximate discontinuous Hamiltonians** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Dharmaraja, S., Kesari, H., Darve, E., Lew, A. J.  
2012; 89 (1): 71-104
- **Application of assembly of finite element methods on graphics processors for real-time elastodynamics**  
Cecka, C., Lew, A., Darve, E.  
2012
- **A family of discontinuous Galerkin methods for nearly and perfectly incompressible elasticity** *ESAIM: Mathematical Modelling and Numerical Analysis*  
Shen, Y., Lew, A., J.  
2012; 46 (5): 1003-1028
- **Effective macroscopic adhesive contact behavior induced by small surface roughness** *JOURNAL OF THE MECHANICS AND PHYSICS OF SOLIDS*  
Kesari, H., Lew, A. J.

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2011; 59 (12): 2488-2510

- **Parameterization of planar curves immersed in triangulations with application to finite elements** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Rangarajan, R., Lew, A. J.  
2011; 88 (6): 556-585
- **Variational time integrators for finite-dimensional thermo-elasto-dynamics without heat conduction** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Mata, P., Lew, A. J.  
2011; 88 (1): 1-30
- **OPTIMAL CONVERGENCE OF A DISCONTINUOUS-GALERKIN-BASED IMMersed BOUNDARY METHOD** *ESAIM-MATHEMATICAL MODELLING AND NUMERICAL ANALYSIS-MODELISATION MATHÉMATIQUE ET ANALYSE NUMÉRIQUE*  
Lew, A. J., Negri, M.  
2011; 45 (4): 651-674
- **Assembly of finite element methods on graphics processors** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Cecka, C., Lew, A. J., Darve, E.  
2011; 85 (5): 640-669
- **A discontinuous-Galerkin-based extended finite element method: immersed boundary perspective and optimal convergence**  
Lew, A., Shen, Y.  
2011
- **An optimally convergent discontinuous Galerkin-based extended finite element method for fracture mechanics** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Shen, Y., Lew, A.  
2010; 82 (6): 716-755
- **An adaptive stabilization strategy for enhanced strain methods in non-linear elasticity** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Ten Eyck, A., Lew, A.  
2010; 81 (11): 1387-1416
- **Stability and convergence proofs for a discontinuous-Galerkin-based extended finite element method for fracture mechanics** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*  
Shen, Y., Lew, A.  
2010; 199 (37-40): 2360-2382
- **Some new algorithmic ideas for the simulation of ballistic gel penetration**  
Potts, M., A., Lew, A., Ryckman, R., Rangarajan, R.  
2010
- **Explicit asynchronous contact algorithm for elastic-rigid body interaction**  
Ryckman, R., A., Lew, A., J.  
edited by Zavarise, G., Wriggers, P.  
2010
- **Role of surface roughness in hysteresis during adhesive elastic contact** *PHILOSOPHICAL MAGAZINE LETTERS*  
Kesari, H., Doll, J. C., Pruitt, B. L., Cai, W., Lew, A. J.  
2010; 90 (12): 891-902
- **A discontinuous-Galerkin-based immersed boundary method with non-homogeneous boundary conditions and its application to elasticity** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*  
Rangarajan, R., Lew, A., Buscaglia, G. C.  
2009; 198 (17-20): 1513-1534
- **A discontinuous-Galerkin-based immersed boundary method** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Lew, A. J., Buscaglia, G. C.  
2008; 76 (4): 427-454

- **Stability of asynchronous variational integrators** *JOURNAL OF COMPUTATIONAL PHYSICS*  
Fong, W., Darve, E., Lew, A.  
2008; 227 (18): 8367-8394
- **A microstructurally informed model for the mechanical response of three-dimensional actin networks** *COMPUTER METHODS IN BIOMECHANICS AND BIOMEDICAL ENGINEERING*  
Kwon, R. Y., Lew, A. J., Jacobs, C. R.  
2008; 11 (4): 407-418
- **Adaptive stabilization of discontinuous Galerkin methods for nonlinear elasticity: Analytical estimates** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*  
Ten Eyck, A., Celiker, F., Lew, A.  
2008; 197 (33-40): 2989-3000
- **Towards long-time simulation of soft-tissue simulant penetration**  
Rangarajan, R., Ryckman, R., Lew, A.  
2008
- **Adaptive stabilization of discontinuous Galerkin methods for nonlinear elasticity: Motivation, formulation, and numerical examples** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*  
Ten Eyck, A., Celiker, F., Lew, A.  
2008; 197 (45-48): 3605-3622
- **Parallel asynchronous variational integrators** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Kale, K. G., Lew, A. J.  
2007; 70 (3): 291-321
- **Parallel Asynchronous Variational Integrators**  
Lew, A.  
edited by Papadrakakis et al., M.  
2007
- **Discontinuous Galerkin methods for non-linear elasticity** *INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING*  
Ten Eyck, A., Lew, A.  
2006; 67 (9): 1204-1243
- **Quantum mechanics based multiscale modeling of stress-induced phase transformations in iron** *JOURNAL OF THE MECHANICS AND PHYSICS OF SOLIDS*  
Lew, A., Caspersen, K., Carter, E. A., Ortiz, M.  
2006; 54 (6): 1276-1303
- **Effective cohesive behavior of layers of interatomic planes** *ARCHIVE FOR RATIONAL MECHANICS AND ANALYSIS*  
Braides, A., Lew, A. J., Ortiz, M.  
2006; 180 (2): 151-182
- **Discontinuous Galerkin methods for nonlinear elasticity**  
Eyck, A., Ten, Lew, A.  
edited by Mota Soares et al., C., A.  
2006
- **Importance of shear in the bcc-to-hcp transformation in iron** *PHYSICAL REVIEW LETTERS*  
Caspersen, K. J., Lew, A., Ortiz, M., Carter, E. A.  
2004; 93 (11)
- **Variational time integrators** *International Journal for Numerical Methods in Engineering*  
Lew, A., Marsden, J., Ortiz, M., West, M.  
2004; 60: 153-212
- **Optimal BV estimates for a discontinuous Galerkin method for linear elasticity** *Applied Mathematics Research eXpress*  
Lew, A., Neff, P., Sulsky, D., Ortiz, M.

2004; 3

- **An overview of variational integrators** in *Finite Element Methods: 1970's and Beyond* volume dedicated to T. Hughes in his 60th birthday  
Lew, A., Marsden, J., E., Ortiz, M., West, M.  
edited by Franca, L., P., Tezduyar, T., E., Masud, A.  
CIMNE, Barcelona.2004: 1
- **Asynchronous variational integrators** *Archive for Rational Mechanics & Analysis*  
Lew, A., Marsden, J., Ortiz, M., West, M.  
2003; 2 (167): 85-146
- **Bridging time-scales in solid dynamics: asynchronous variational integrators**  
Lew, A., Ortiz, M.  
edited by Bathe, K., J.  
2003
- **An artificial-viscosity method for the Lagrangian analysis of shocks in solids with strength on unstructured, arbitrary order tetrahedral meshes** *Journal of Computer-Aided Materials Design*  
Lew, A., Radovitzky, R., Ortiz, M.  
2001; 2-3 (8): 213-231
- **Un programa general de elementos finitos en paralelo**  
Buscaglia, G., Dari, E., Lew, A., Raschi, M.  
1999