

Nicholas Penha Malaya

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EDUCATION

The University of Texas at Austin, Austin, TX

- Ph.D., Engineering, 2016
 - Numerical Simulation of Synthetic, Buoyancy-Induced Columnar Vortices
 - Advisor: Professor Robert D. Moser
- M.S., Mechanical Engineering, 2009

Georgetown University, Washington, D.C.

- B.S., Physics & Mathematics, *with honors*, 2007

RESEARCH INTERESTS

High Performance Computing, Computational Science, Computer Modeling, Exascale Computing, Turbulence, Verification Validation & Uncertainty Quantification, Bayesian Inference, Spectral Methods, Machine Learning

RESEARCH EXPERIENCE

HPC Applications Software Technology
AMD Research

Austin, TX

Computational Scientist

Dec. 2016 – Present

Department of Mechanical Engineering
The University of Texas at Austin

Austin, TX

Doctoral Candidate

Jan. 2014 – Dec. 2016

Institute for Computational Engineering and Sciences
The University of Texas at Austin

Austin, TX

Research Engineering/Scientist Associate II

Jan. 2010 – Dec. 2013

Physics Laboratory, Optical Technology Division
National Institute of Standards and Technology

Gaithersburg, MD

Assistant Researcher

May 2005 – August 2005

AWARDS

- “Best Paper” - 2012 TACC-Intel Highly Parallel Computing Symposium, April 10-11, Austin, TX
- Cockrell School of Engineering Thrust 2000 Ph.D. Fellowship
- 2007 Treado Medal, Georgetown University

TEACHING
EXPERIENCE

The University of Texas at Austin

CSE 380 - Tools/Techniques of Computational Science **Fall 2015, 2016**

Los Alamos National Laboratory

Computational Physics Student Summer Workshop **Summer 2012 - 2017**

REFEREED

JOURNAL

PUBLICATIONS

Graham, J., Kanov, K., Yang X.I.A., Lee M.K., **Malaya, N.**, Lalescu, C.C., Burns, R., Eyink, G., Szalay, A., Moser, R.D. & Meneveau, C. “A Web Services-accessible database of turbulent channel flow and its use for testing a new integral wall model for LES.” *Journal of Turbulence* (2015)

M. Lee, **N. Malaya**, Rhys Ulerich, Robert D. Moser, Experiences from Leadership Computing in Simulations of Turbulent Fluid Flows, *Computing in Science & Eng.*, vol. 16, no. 5, 2014, pp. 2431.

T. A. Oliver, **N. Malaya**, R. Ulerich, and R. D. Moser, Estimating uncertainties in statistics computed from direct numerical simulation, *Phys. Fluids* 26, 035101 (2014). <http://dx.doi.org/10.1063/1.4866813>

M. Lee, **N. Malaya**, and R. D. Moser, “Petascale direct numerical simulation of turbulent channel flow on up to 786k cores,” in *Proceedings of the 2013 ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*. ACM Press, 2013

N. Malaya, K. C. Estacio-Hiroms, R. H. Stogner, K. W. Schulz, P. T. Bauman, G. F. Carey, “MASA: A Library for Verification Using Manufactured and Analytical Solutions”, *Engineering with Computers*, 29(4), 487–496, 2013

N. Malaya, T. Oliver, K. C. Estacio-Hiroms, “Manufactured Solutions for the Favre-Averaged Navier-Stokes Equations with Eddy-Viscosity Turbulence Models”, *Technical Paper*, 50th AIAA ASM, 2012.

Nicholas Malaya, Karl W. Schulz, Robert D. Moser “Petascale I/O using HDF-5”, *Teragrid’10 Technical Paper*, Association for Computing Machinery, August 2, 2010.

Robert D. Moser, **Nicholas P. Malaya**, Henry Chang, et. al., “Theoretically based optimal large-eddy simulations”, *Physics of Fluids*, October 23, 2009.

BOOK

CHAPTERS

Damon McDougall, **Nicholas Malaya**, Robert D. Moser, “The Parallel C++ Statistical Library for Bayesian Inference: QUESO”, *Handbook of Uncertainty Quantification*, edited by Roger Ghanem, David Higdon, Houman Owhadi, (Springer International Publishing, 2017)

Nicholas Malaya, Robert D. Moser, Amitabh Bhattacharya. “Modeling Multi-point Correlations in Wall-Bounded Turbulence”, Progress in Wall Turbulence: Understanding and Modeling, edited by M. Stanislas, J. Jimenez, and I. Marusic (Springer, Netherlands, 2011), Vol. 14, pp. 183190.

PAPERS IN
PREPARATION

Nicholas Malaya, Robert D. Moser, “Numerical Simulation of Synthetic Columnar Vortices”, Physics of Fluids

Nicholas Malaya, Roy H. Stogner, Robert D. Moser, “A Penalty Method Model for Immersed Boundaries and Control Surfaces”, International Journal for Numerical Methods in Fluids

REFEREED
CONFERENCE
PUBLICATIONS

K. W. Schulz, R. Ulerich, **N. Malaya**, P. T. Bauman, R. Stogner, and Chris Simmons, “Early Experiences Porting Scientific Applications to the Many Integrated Core (MIC) Platform”, TACC-Intel Highly Parallel Computing Symposium, Austin, TX, April 10–11, 2012. Winner - Best Paper.

Rhys Ulerich, Kemelli C. Estacio-Hiroms, **Nicholas Malaya**, and Robert D. Moser. A transient manufactured solution for the compressible NavierStokes equations with a power law viscosity. In 10th World Congress on Computational Mechanics, So Paulo, Brazil, July 2012. doi: 10.5151/meceng-wccm2012-16661. (pages 108, 223, 227).

Juan Sillero, Javier Jimenez, Robert. D. Moser, **Nicholas Malaya**, “Direct Simulation of a zero-pressure gradient turbulent boundary layer up to $Re_\theta = 6650$ ”, Technical Paper, 13th European Turbulence Conference, September, 2011.

INVITED

PRESENTATIONS **Nicholas Malaya**, “Numerical Investigation of Synthetic Dust Devils”, AMD Research, Austin, TX, July 8th, 2016.

Nicholas Malaya, “Verification, Validation and Uncertainty Quantification in Turbulence”, Texas Advanced Computing Center, Austin, TX, May 12th, 2016.

Nicholas Malaya, “Numerical Investigation of Synthetic, Buoyancy-Induced Columnar Vortices”, Sandia National Laboratories, Albuquerque, NM, March 16th, 2016.

Nicholas Malaya, “Verification & Software Quality in Scientific Computing”, Los Alamos Computational Physics Student Summer Workshop, 2014.

Nicholas Malaya, “The Method of Manufactured Solutions”, Los Alamos Computational Physics Student Summer Workshop, 2013.

Nicholas Malaya, Christopher Simmons, “Scientific Software Engineering Best Practices”, Los Alamos Computational Physics Student Summer Workshop, 2012.

Nicholas Malaya & Robert D. Moser, “Tools and Techniques for Code Verification using Manufactured Solutions.”, SIAM Conference on Uncertainty Quantification, April 2-4, 2012, Raleigh, North Carolina

Nicholas Malaya, Karl W. Schulz, “Verification through the MASA Library”, Los Alamos Computational Physics Student Summer Workshop, 2011.

Nicholas Malaya, Rhys Ulerich, Robert Moser, “Petascale Direct Numerical Simulations of Turbulent Channel Flow”, ESP Kick-off Workshop and Project Plan Presentation, Oct. 18th, 2010.

Nicholas Malaya “Theoretically Based Optimal LES”, TFS/NRE Seminar, Department of Mechanical Engineering, Oct. 29th, 2009.

CONFERENCE **N. Malaya**, R. Stogner, R. Moser, Numerical Investigation of Synthetic Buoyancy-
PRESENTATIONS Induced Columnar Vortices, Bulletin of the American Physical Society 60, 2015
Nicholas Malaya MASA: A Tool for the Verification of Scientific Software, SciPy20164

N. Malaya, R. Ulerich, T. Oliver, R Moser, Estimating Uncertainties in Statistics Computed from DNS, APS Meeting Abstracts 1, 21004, 2012

Nicholas Malaya, Karl Schulz, “Verification through the MASA Library”, DOE PSAAP Annual Review, 2011

Nicholas Malaya, Pk Yeung, “Collaborative Research: Enabling Discovery in High Reynolds Number” Turbulence via Advanced Tools for Petascale Simulation and Analysis, 2010

Nicholas Malaya, Amitabh Bhattacharya, Robert Moser, “Theoretically Based Optimal LES”, APS DFD, 2008.

TECHNICAL
SKILLS

Extensive experience developing numerical methods for simulation of physical phenomena on workstation and parallel computing environments

Programming Experience:

- Languages: C/C++, Fortran, Python(Num/Scipy), L^AT_EX, Bash, Mathematica, Octave/Matlab
- Development Env: Linux, Emacs, Git, SVN, Buildbot, TravisCI
- Stanford Certificate in Machine Learning (Online) from Andrew Ng
- Libraries: MPI, OpenMP, HDF-5, FFTW, BLAS, Lapack, Hadoop, Dakota

SERVICE

Committees:

- Program Committee, Great Lakes Consortium for Petascale Computation (2012–2015)

- Reviewer, Blue Waters Graduate Fellowship Program (2014–present)

Journal Referee:

- Journal of Fluid Mechanics
- Engineering with Computers
- Journal of Computational Physics

MEMBERSHIPS APS, SIAM, ACM, AIAA

CITIZENSHIP United States of America

LAST UPDATED March 7, 2017

REFERENCES

Todd Oliver, Ph.d.
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 Center for Predictive Engineering and Computational Science
 Institute for Computational Engineering and Sciences
 University of Texas at Austin
 E-Mail: oliver@ices.utexas.edu
 Phone: (617) 270-3124

Karl W. Schulz, Ph.d.
 Principal Engineer, Enterprise High Performance Computing Group, Intel
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Professor Robert Moser
 Institute for Computational Engineering and Sciences
 and Department of Mechanical Engineering
 University of Texas at Austin
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