# Daniel Abdi

## Personal Data


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| Mailing Address: | 473 Monroe st, Apt 2,<br>Monterey, California 93940 USA |
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| Nationality: | Ethiopia |


## Education

**February 2014** | Doctor of Philosophy in Civil Engineering,
**The University of Western Ontario**, London, ON, CA
Thesis: "Numerical evaluation of aerodynamic roughness of the built environment and complex terrain" | Advisor: Dr. Girma Bitsuamlak
Specialization: *Computational wind engineering, CFD*

**August 2006** | Master of Science in Civil Engineering,
**Indian Institute of Technology**, Roorkee, IN
Thesis: "Analysis of eccentrically loaded slabs" | Advisor: Prof. K.K. Singh
Specialization: *Structural engineering*

**August 2003** | Bachelor of Science in Civil Engineering,
**Addis Ababa University**, Addis Ababa, ET
Project: "Structural design of a G+5 building" | Advisor: Dr. G. Zereayohannes
Specialization: *Structural engineering*

## Work Experience

*Present* – May 2014 | Research associate at the Naval Postgraduate School (NPS), California
My research focuses on porting the non-hydrostatic unified model of the atmosphere (NUMA) to many-core machines, such as GPUs and Intel MIC. NUMA uses both Continuous and Discontinuous galerkin methods with explicit and implicit-explcit (IMEX) time integrators.

*Feb 2014* – May 2012 | Research assistant at the University of Western Ontario, Canada
Developed a high performance CFD program for simulating wind flow on complex terrain.

*May 2012* – Jan 2009 | Research assistant at Florida International University, Florida
Started my research in Wind Engineering, while working as a teaching assistant for different civil engineering courses .

*Jan 2009* – Sep 2006 | Lecturer at Addis Ababa University, Ethiopia
Thought many civil engineering courses to 3rd year undergraduate students. Supervised final year projects on the design of tall story buildings.

*Sep 2004* – Sep 2003 | Part time structural Engineer at Elugi Consulting, Ethiopia
Conducted structural design and detailing of medium rise buildings for several clients.

*Sep 2004* – Sep 2003 | Assistant Lecturer at Addis Ababa University, Ethiopia
Served as a tutor for several civil engineering courses.

## Relevant civil engineering courses

- Structural Dynamics
- Computational Fluid Dynamics
- Finite Element Analysis
- Design of Highway Bridges
- Pre-stressed Concrete Design
- Advanced Project Planning
- Multistory buildings
- CAD of structures and foundations
- Advanced Foundation Engineering
- Boundary Layer Meteorology
- Wind Engineering
- Bluff body aerodynamics
- GIS in CEE
- Construction cost dynamics
- Design Optimization
- Non-parametric statistical methods

## Journals


[2] D. Abdi and G. Bitsuamlak. "Asynchronous parallelization of a CFD solver". In: *Journal of Computational Engineering* (2015). DOI: 10.1155/2015/295393.

[5] D. Abdi and G. Bitsuamlak. "Numerical evaluation of the effect of multiple roughness changes". In: *Wind and Structures* 19 (6 2014), pp. 585 –601. DOI: 10.12989/was.2014.19.6.585.

[6] D. Abdi and G. Bitsuamlak. "Wind flow simulations in idealized built environment models of various level of complexity". In: *Under review in Wind and structures* (2014).

[7] D. Abdi and G. Bitsuamlak. "Wind flow simulations on idealized and real complex terrain using various turbulence models". In: *Advances in Engineering Software* 75 (2014), pp. 30 –41. DOI: 10.1016/j.advengsoft.2014.05.002.

[10] D.S. Abdi and F.X. Giraldo. "Efficient Construction of Unified Continuous and Discontinuous Galerkin Formulations for the 3D Euler Equations". In: *In preparation* (2015).

[11] D.S. Abdi, L.C. Wilcox, T. Warburton, and F.X. Giraldo. "A GPU accelerated continuous and discontinuous Galerkin non-hydrostatic atmospheric model". In: *In preparation* (2015).


## Conferences


[1] D. Abdi and G. Bitsuamlak. "Assessing the effect of boundary conditions on simulating atmospheric boundary layer". In: *2012 Joint Conference EMI/PMC*. 2012.

[3] D. Abdi and G. Bitsuamlak. "Development of computational tools for large scale wind simulations". In: *ATC and SEI Advances in Hurricane Engineering Conference*. 2012, pp. 1006 –1016. DOI: 10.1061/9780784412626.087.

[4] D. Abdi and G. Bitsuamlak. "Estimation of surface roughness using CFD". In: *The Fifth International Symposium on Computational Wind Engineering (CWE-2010)*. 2010.

[8] D. Abdi, S. Levin, and G. Bitsuamlak. "Application of an artificial neural network model for boundary layer wind tunnel profile development". In: *11th Americas conference on wind Engineering*. 2009.

[9] D. Abdi, L. Wilcox, T. Warburton, and F.X. Giraldo. "GPU Accelerated Spectral Element Methods: 3D Euler equations". In: *American Geophysical Union Fall meeting*. San Francisco, US, 2015.

[12] F.X. Giraldo, A. Mueller, M. Kopera, and D. Abdi. "Towards ExaScale computing with NUMA: An element-based Galerkin Nonhydrostatic Global and Atmopsheric Modeling". In: *American Geophysical Union Fall meeting*. San Francisco, US, 2015.

[13] A. Mueller, D. Abdi, S. Marras, M. Kopera, and F.X. Giraldo. "Cloud Simulations with the Nonhydrostatic Unified Model of the Atmosphere (NUMA)". In: *SIAM Conference on Mathematical and Computational Issues in the Geosciences*. Stanford, CA, USA, 2015.

[15] A. Mueller, D. Abdi, M. Kopera, L. Wilcox, and F.X. Giraldo. “Towards operational weather prediction at 3.0km global resolution with the dynamical core NUMA”. In: *KIAPS, Workshop on solution of PDEs on the Sphere*. Seoul, South Korea, 2015.

[16] L. Wilcox, T. Warburton, D. Abdi, A. Kloeckner, and F.X. Giraldo. “Accelerating NUMA in a performance portable way”. In: *ICMS, Galerkin methods with applications in weather and climate forecasting*. Edinburgh, United Kingdom, 2015.

## Talks

[14] A. Mueller, M. Kopera, S. Marras, D. Abdi, and F.X. Giraldo. *Eficiency of high-order continuous and discontinuous Galerkin methods*. Offenbach, Germany, 2015.

## Editorial/Reviews

Building and Environment, Wind and Structures

## Codes

*Present* 2014 | Contributed to the numerical weather prediction model NUMA. Responsible for unifying implementations of the continuous / discontinuous Galerkin methods, accelerating NUMA using GPUs, implementing parallel grid generation library p4est in the DG code. | NUMA website

*Present* 2013 | Developer of a Computational Fluid dynamics (CFD) solver using finite-volume and high order discontinuous Galerkin method. It has different RANS/LES turbulence models for use in wind flow simulations on complex terrain. Parallelized to use a cluster of CPUs and GPUs using the domain decomposition method.

*2010* 2006 | Developer of a Finite Element (FEM) structural analysis and design code using different national codes and standards. It has the following features: linear static and dynamic analysis, response spectrum plots, non-linear p-delta analysis, buckling analysis of 3D columns, reinforced concrete and steel design, and finally preparation of AutoCAD drawing.

## HPC Training

August 2015 | Argonne training program on extreme-scale computing
*A 15 day 13 hours/day intensive training* St. Charles, IL, Chicago

October 2015 | GPU Hackathon, Oak Ridge Leadership Computing Facility
*A one week training on hybrid CPU-GPU programming*, Knoxville, TN

## Wind Labs

*2012* 2009 | The Wall of Wind (**WoW**) facility for full-scale testing of buildings in hurricane conditions

*2014* 2012 | Alan Davenport Boundary Layer Wind Tunnel (**BLWT**) facility for model scale testing of buildings and bridges

## Programming languages

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| Languages | C, C++, Fortran, Java, x86 assembly, python, javascript |
| Parallel programming | MPI, OpenMP, Cilk, Pthreads<br>CUDA, OpenCL, OpenACC and OCCA |
| Graphics | MFC, QT, Java Swing, Android |
| Database | SQL, Oracle |

## Skills

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|---|---|
| Structural analysis | SAP 2000; ETABS; STAAD. Pro; Ansys FEM |
| CAD modeling | AutoCAD; SolidWorks ; Design modeler; Arc-GIS; Global - Mapper |
| CFD solvers | Fluent; Ansys Workbench; OpenFOAM; Star-CCM+ |
| Grid generators | ICEM CFD; OpenFOAM snappyHexMesh; Gambit |
| Visualization | Tecplot 360; ParaView; Ansys CFD Post Processing |
| Statistical packages | Matlab, MatchCad, Mathematica, Maple, R |
| Project Management: | Primavera p4 |

## Honors and Awards

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| *2014* | National Research Council (NRC) associateships programs |
| *2012* | Full tuition assistantship, The University of Western Ontario |
| *2010* | CHI EPSILON National Honor Society |
| *2009* | Full tuition assistantship, Florida International University |
| *2004* | Full tuition assistantship, Indian Institute of Technology, Roorkee |
| *1998* | Aklilu Lemma Merit Scholarship |

## Memberships

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| *2015* | American Geophysical Union (AGU) |
| *2010* | American Society of Civil Engineers (ASCE) |
| *2010* | American Association of Wind Engineers (AAWE) |