# Marc T. Henry de Frahan

*US citizen, Applied Mathematics/Mechanical engineer*

*2525 Wewatta Way Apt 306*
*Denver, CO, 80216*
*marchdf@gmail.com*
*(734)747-0156*

## Experience

**Post-doctoral Researcher, National Renewable Energy Laboratory** 2016-present
Next-generation simulations of wind farms and combustion processes

## Education

**Ph.D. in Mechanical Engineering** 2011-2016
University of Michigan, Ann Arbor, MI
Thesis: *Numerical simulations of shock and rarefaction waves interacting with interfaces in compressible multiphase flows*
Advisor: E. Johnsen, Assistant Professor of Mechanical Engineering

**M.S. in Applied Mathematics Engineering** 2009-2011
Université Catholique de Louvain, Belgium
Thesis: *Implementation of a Discontinuous Galerkin Method for hyperbolic PDEs on GPUs*
Advisors: Prof. J-F Remacle, Prof. P. Chatelain, Prof. V. Legat.

**B.S. in Applied Mathematics Engineering** 2007-2009
Université Catholique de Louvain, Belgium

## Research Interests

Fluid mechanics - multiphase flows, hydrodynamic instabilities, turbulence
Energy - turbomachinery, combustion, wind farms
High order numerical methods for computational fluid dynamics
High performance computing with graphics processing units

## Fellowships and Awards

**AIAA CFD Best Student Paper Award ($3^{d}$ place)** 2015
American Institute of Aeronautics and Astronautics

**Rackham Predoctoral Fellowship** 2015
University of Michigan

**Rackham Centennial Fellowship** 2013
University of Michigan

**NIF Poster Winner** 2012
Lawrence Livermore National Laboratory 2012 Summer Poster Session

**High Distinction** 2011
M.S. in Applied Mathematics Engineering at the Université Catholique de Louvain

## Publications

M. T. Henry de Frahan, J. L. Belof, R. M. Cavallo, V. A. Raevsky, O. N. Ignatova, A. Lebedev, D. S.

Ancheta, B. S. El-dasher, J. N. Florando, G. F. Gallegos, E. Johnsen and M. M. LeBlanc, **Experimental and Numerical Investigations of Beryllium Strength Models Using the Rayleigh-Taylor Instability**, *featured article in J. Appl. Phys.*, 117(22):225901, 2015

M. T. Henry de Frahan, S. Varadan, and E. Johnsen, **A new limiting procedure for discontinuous Galerkin methods applied to compressible multiphase flows with shocks and interfaces**, *J. Comput. Phys.*, 280(0):489 – 509,2015

M. T. Henry de Frahan, P. Movahed, and E. Johnsen, **Numerical simulations of a shock interacting with successive interfaces using the Discontinuous Galerkin method: the multilayered Richtmyer-Meshkov and Rayleigh-Taylor instabilities**, *Shock Waves*, 25(4):329–345, 2015

C. A. Di Stefano, G. Malamud, M. T. Henry de Frahan, C. C. Kuranz, A. Shimony, S. R. Klein, R. P. Drake, E. Johnsen, D. Shvarts, V. A. Smalyuk, and D. Martinez, **Observation and modeling of mixing-layer development in high-energy-density, blast-wave-driven shear flow**, *Phys. Plasmas*, 21(5):056306, 2014

M. T. Henry de Frahan and E. Johnsen, **Mixing in blast-driven hydrodynamic instabilities**, *In preparation for J. Fluid Mech.*, 2016

## Conference Proceedings

M. T. Henry de Frahan, L. Khieu, and E. Johnsen, **High-order Discontinuous Galerkin Methods Applied to Multiphase Flows**, $22^d$ *AIAA Computational Fluid Dynamics Conference. American Institute of Aeronautics and Astronautics*, doi: 10.2514/6.2015-3045, 2015, AIAA CFD Best Student Paper Award ($3^{\text{d}}$ place)

M. T. Henry de Frahan and E. Johnsen, **Discontinuous Galerkin method for multifluid Euler equations**, *In 21st AIAA Computational Fluid Dynamics Conference. American Institute of Aeronautics and Astronautics*, doi: 10.2514/6.2013-2595, 2013

M. T. Henry de Frahan, P. Movahed, and E. Johnsen, **Investigating the multilayered Richtmyer-Meshkov instability with high-order accurate numerical methods**, *In 29th International Symposium on Shock Waves 2, Springer International Publishing*, 2015

## Skills

**Scientific programming**
C/C++, Python, Git, Bash, R, C for CUDA, MPI, OpenMP, LaTeX, VisIt, Gmsh, Matlab, Hydra, Ares, Yorick, ITS Monte-Carlo Codes

**Operating systems**
GNU/Linux, Windows

**Languages**
English, French