

**Opportunity Title:** Faculty (preferred)-Computational Study of Detonation Combustion in Nat'l Gas/Coal-Derived Syngas  
**Opportunity Reference Code:** NETL-2016-05-7-Ferguson

**Organization:** National Energy Technology Laboratory (NETL)

**Reference Code:** NETL-2016-05-7-Ferguson

**Application Deadline:** 8/30/2016 12:00:00 AM Eastern Time Zone

**Description TITLE:** Mechanical/Aerospace/Chemical Engineer – Computational Study of Detonation Combustion in Natural Gas and Coal-Derived Syngas  
**DEPARTMENT:** U.S. Department of Energy

**AGENCY:** National Energy Technology Laboratory (NETL)

**LEVEL:** Faculty (Preferred), Post-Doctoral Research Associate

**POSITION INFORMATION:** Temporary Appointment - 3 month between approximately June 1, 2016 and August 30, 2016; Full-Time (40 hours per week).

**OPEN PERIOD:** Open until filled

**DUTY LOCATION:** Morgantown, WV (Preferred)

**WHO MAY BE CONSIDERED:** United States Citizens, LPRs, & Foreign Nationals with appropriate approval which includes F-1 OPT with EAD (STEM extension not valid), J-1 Exchange Visitor, and LPR with EAD

#### SUMMARY:

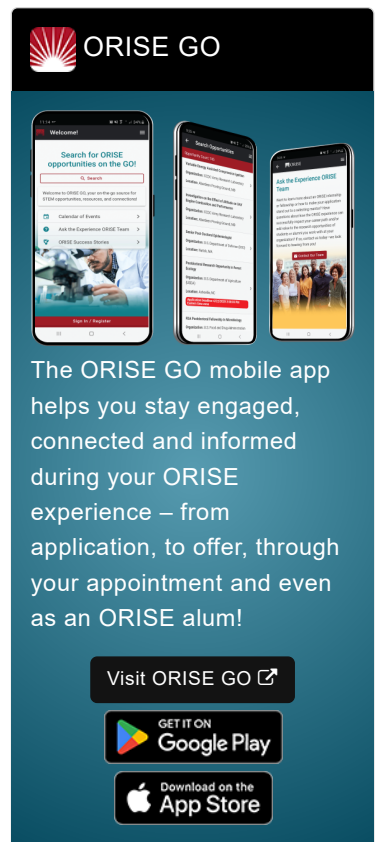
An opportunity exists for a visiting researcher to conduct applied research in support of NETL Pressure Gain Combustion research. Research efforts associated with this position focus primarily on the anticipated interactions between the detonation wave / exhaust flow emanating from a Rotating Detonation Combustor/Engine (RDE) and downstream components. Broadly, the project goals include the following:

1. Develop a computational model that accurately (current state-of-the-art (SOTA)) predicts the behavior of a continuous detonation wave within a RDE when operating on hydrogen and or natural gas.
2. Develop computational models to study the influence of various transition geometries between the RDE combustor and a current SOTA staged gas turbine inlet geometry.
3. Develop computational models to study the influence of a detonation wave emitted from an RDE on staged turbine and various turbine blade designs.
4. Collaborate in an integrated team research environment.

#### SPECIFIC TASKS:

The specifically envisioned tasks support the broad goals described above, and may include one or more of the following elements.

1. Develop a comprehensive model using ANSYS-FLUENT and/or OpenFOAM of the NETL baseline RDE geometry operating on Hydrogen/Air. This model must produce result consistent with



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experimental results produced in NETL's experimental RDE test rig and published in open source literature.

2. Utilize the model previously developed to perform parametric studies on RDE operation related to the flow rates, equivalence ratio and backpressure.
3. Extrapolate the performance of the RDE combustor to "turbine-like" conditions using SOTA F-Class equivalent compressor outlet or turbine inlet conditions.
4. Utilizing the model previously develop to evaluate the impact of various combustor exhaust transitions, turbine inlet and turbine blade geometries.

#### **KEY REQUIREMENTS:**

- Applicants must be U.S. Citizens or an approved Foreign Nationals.
- An ideal candidate will have expertise in computational combustion and fluid mechanics, heat transfer and thermodynamics, specifically with application to highly dynamic environments. In addition, the applicant should have a good understanding of staged turbine performance and design, and have a working understanding of the current state-of-the-art. The applicant should have working knowledge of commercial and open source Computational Fluid Dynamics software.

#### **HOW TO APPLY:**

Applicants should apply through the Oak Ridge Institute for Science and Education (ORISE) program. The ORISE Program provides opportunities for undergraduate students, recent graduates, graduate students, postdoctoral researchers, and faculty researchers. NETL utilizes the ORISE program to support research within NETL's Research & Innovation Center.






- Interested applicants should complete the online application at <http://www.ornl.gov/netl/>
- In the online application **list Dr. Don Ferguson as your requested mentor**. This will associate your application with this job posting. Please send a CV to [Donald.ferguson@netl.doe.gov](mailto:Donald.ferguson@netl.doe.gov)
- If you have additional questions please contact Nancy Andres, [nancy.andres@netl.doe.gov](mailto:nancy.andres@netl.doe.gov), who is the NETL ORISE program contact.

#### **Eligibility Requirements**

- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** ([12](#))
  - **Communications and Graphics Design** ([1](#))
  - **Computer, Information, and Data Sciences** ([16](#))
  - **Earth and Geosciences** ([21](#))
  - **Engineering** ([27](#))
  - **Environmental and Marine Sciences** ([14](#))
  - **Life Health and Medical Sciences** ([45](#))

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- **Mathematics and Statistics** ([10](#) )
- **Other Non-Science & Engineering** ([13](#) )
- **Physics** ([16](#) )
- **Science & Engineering-related** ([1](#) )
- **Social and Behavioral Sciences** ([28](#) )