

Expanding Knowledge of Explosions

Greymouth, 2010

Buncefield, 2005



Elaine Oran

Adjunct Professor, Aerospace Engineering

SN1994D

CURRENT RESEARCH

Understanding combustion science to stop, control, and create explosions

Dr. Elaine Oran, at the University of Maryland, studies the theoretical and computational problems of physics and engineering involving natural, accidental, and controlled explosions. By understanding the fundamental science underlying combustion and explosion, Dr. Oran hopes to extend her insights that will help us avoid explosions in coal mines and fuel-storage plants, develop efficient, "clean" engines for high-speed flight, and understand supernovae and many other cosmic and terrestrial explosions. For example, in December 2005, the Buncefield fuel depot in the United Kingdom caught on fire and resulted in a series of explosions. It caused £2 billion in damages, but fortunately few injuries. Experts were immediately deployed to investigate the conflagration, but precise causes remain unknown. Researching the mechanisms behind these explosions will be invaluable in eliminating further mishaps.

Explosions, whether natural, accidental, or controlled, all involve depositing energy into a fluid background at a speed fast enough to create shock waves. Using the computer as a major tool, Dr. Oran designs numerical algorithms and computer programs to study, predict, and diagnose these phenomena. These computer programs usually run on very large-scale computers, some of which are the fastest in the world. Dr. Oran's research team collaborates with the US Naval Research Laboratory, Sandia National Laboratory, and other cutting-edge researchers around the world to test her predictions and generate new insights about the basic controlling mechanisms of explosive phenomena.

Current research areas include:

- Understanding Key Physics Underlying All Explosions: One of the...

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AFFILIATION



University of Maryland College Park Campus

EDUCATION

- Ph.D. in Engineering and Applied Science 1972, Yale University
- M.Ph. in Physics 1968, Yale University
- A.B. in Chemistry and Physics 1966, Bryn Mawr College

AWARDS

- Docteur Honoris Causa, 2015
- Hoyt Hottel (Plenary, Keynote) Lecture, August 2014
- American Physical Society Fluid Dynamics Prize and Otto Laporte Lecture, 2013
- Honorary Doctorate of Science, 2010
- Docteur Honoris Causa, 2006
- and 1 more...

RESEARCH AREAS

Technology, Space, Chemistry, Computational Sciences / Mathematics

FUNDING REQUEST

Your contributions will support Dr. Elaine Oran at the University of Maryland as she continues to research the fundamental physics of natural, accidental, and controlled explosions. Donations will help fund personnel and computer equipment, including computer processors, memory for data storage, and other areas necessary for maintenance and operation. Partner with her team as they harness the power of explosions to create new energy sources, prevent catastrophic accidents, and better understand the universe.