A Gallery of Combustion and Fire

A Gallery of Combustion and Fire is the first book to provide a graphical perspective of the extremely visual phenomenon of combustion in full color. It is designed primarily to be used in parallel with, and supplement existing combustion textbooks that are usually in black and white, making it a challenge to visualize such a graphic phenomenon. Each image includes a description of how it was generated, which is detailed enough for the expert but simple enough for the novice. Processes range from small-scale academic flames up to full-scale industrial flames under a wide range of conditions such as low and normal gravity, atmospheric to high pressures, actual and simulated flames, and controlled and uncontrolled flames. Containing over 500 color images, with over 230 contributors from over 75 organizations, this volume is a valuable asset for experts and novices alike.

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Preface

This book is the result of two primary factors. The first is the success of a previous Cambridge University Press book published in 2003 entitled *A Gallery of Fluid Motion* edited by M. Samimy, K. S. Breuer, L. G. Leal, and P. H. Steen. That book was patterned after two earlier graphical books on the subject of fluid flow. The first is *Illustrated Experiments in Fluid Mechanics: The NCFMF Book of Film Notes* by Asher H. Shapiro, published by MIT Press in 1972. The second was a very successful book by Milton Van Dyke, entitled *An Album of Fluid Motion*, published by Parabolic Press in 1982. All of the images that appear in *A Gallery of Fluid Motion* were winning images as selected by the American Physical Society in an annual contest held since 1983. The mostly color images were selected for artistic and technical merit. All of the images were previously published in the journal *Physics of Fluids*.

The second factor leading to this book is the Combustion Art contest sponsored by the Central States Section of the Combustion Institute (CSSCI). Sandra Olson, one of the editors of the present book, has led this competition for many years where the winning art since 2004 is posted online (www.cssci.org/). Cambridge University Press heard about this competition and contacted the CSSCI about authoring a book similar to *A Gallery of Fluid Motion* but on the subject of combustion. Four of the editors of the current book (Agrawal, Baukal, Jacobs, and Olson) are or were members of the CSSCI board. The initial book title was extended from *A Gallery of Combustion* to *A Gallery of Combustion and Fire* when an extensive section on fire was added. The International Association for Fire Safety Science sponsors a fire science image contest that was of interest to this project.

This is the first known book of its type, as no other books were found that take a primarily graphical approach to combustion. There are a number of unique aspects of the book. There are numerous full-color images of all aspects of combustion including actual and simulated flames and fires. Each image includes a brief description with details of how it was generated. The book includes small-scale academic flames, large industrial flames, and fires. A wide range of pressures is considered, including low gravity, atmospheric, and pressurized flames relevant in space, industrial, and propulsion applications, respectively. The book combines the science and art of combustion.

There are many potential benefits of this book. The full-color images are essential to understand combustion, and represent a significant improvement compared to most earlier books on the subject, which are in black and white. There is a full range of flame types from academic to industrial, whereas most combustion books deal with one or the other. The book includes both traditional controlled flames as well as uncontrolled fires. It is detailed enough for the expert yet simple enough for the novice.

The book is designed primarily to supplement existing combustion textbooks used in both undergraduate and graduate courses as well as in short courses on combustion. It should be of interest to anyone working in the field of combustion, including professors, researchers (academic, industrial, and government), designers, students, industrial users, and even to nontechnical readers interested in this subject. While most of the images are included for pedagogical purposes, there are some of artistic merit as well. Due to space limitations, no attempt has been made to be comprehensive, but an objective of the book is to be representative of the numerous types and aspects of combustion. No prerequisite knowledge is required to use the book.