

Preface

This book reflects the results of the 2nd and 3rd International Workshops on Turbulent Spray Combustion held in Chia Laguna (Sardinia) in 2011 and in Heidelberg (Germany) in 2012. The focus of these ‘TCS’ workshops is on reporting the progress of experimental and numerical techniques in two-phase flows, with emphasis on spray combustion. The motivation for studies in this area is that knowledge of the dominant phenomena and their interactions in such flow systems is essential for the development of predictive models and their use in combustor and gas turbine design. This necessitates the development of accurate experimental methods and numerical modelling techniques. The workshops aimed at providing an opportunity for experts and young researchers to present the state-of-the-art, discuss new developments or techniques and exchange ideas in the areas of experimentations, modelling and simulation of reactive multiphase flows.

The first chapter reflects on relevant issues of flame structure, auto-ignition and atomization with reference to well-characterized burners, to be implemented by modellers with relative ease. The second chapter presents an overview of first simulation results on target test cases, developed at the occasion of the 1st International Workshop on Turbulent Spray Combustion (Corsica 2009). In the third chapter, evaporation rate modelling aspects are covered, while the fourth chapter deals with evaporation effects in the context of flamelet models. In chapter five, LES simulation results are discussed for variable fuel and mass loading. Chapter six, on PDF modelling, makes the book complete.

In short, we believe that these contributions individually and together are highly valuable for the research community in this field. They allow experts and young scientists to gain more in-depth insight into some of the many aspects of dilute turbulent spray combustion, including state-of-the-art experiments and modelling efforts.

It is our intention to continue our efforts in bringing together experimentalists and modellers of spray combustion. In subsequent workshops, we intend to continue efforts on the ‘target test cases’, for which experimental databases have by now been made available and on which modelling and numerical algorithm issues are being tested. The definition and elaboration of other test cases is also an option for future studies.

When you are reading this book, TCS 4 will already have taken place in Cesme (Turkey) in 2013. We hope that this book may encourage you to participate in this quest in the future. You will find all information on <http://www.tcs-workshop.org/>

Sincerely,

Bart Merci and Eva Gutheil, Editors, On behalf of the TCS organizing committee.

Experiments and Numerical Simulations of Turbulent
Combustion of Diluted Sprays

TCS 3: Third International Workshop on Turbulent Spray
Combustion

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