

# Preface

For a layman the term ‘shock wave’ may sound bizarre and completely superfluous for everyday life. However, this term is relevant in many daily events, for example the fast energy released during every lightning generates a shock wave that eventually decays to a sound wave. A shock wave accompanies every volcanic eruption, and it can be a hazardous event in coal mines; once an unexpected explosion occurs, a shock is transmitted through the mine’s shafts, enhancing its strength due to burning of the coal dust entrained behind the shock front. Attenuating such a shock/blast wave is therefore an important issue. Shock waves accompany every supersonic flight and every missile/spacecraft entering into the earth’s atmosphere. Recently, weak shock waves have been used for treating health problems. Nowadays it is normal practice to shatter kidney stones using focused weak shock waves. Shock waves are also used for returning a broken bone to its original location and there is an ongoing research on using shock waves for eliminating cancer growths. It is clear from this brief foreword that studying the physical behavior of shock and blast waves is essential for developing reliable ways for attenuating them, in the case of destructive shocks, and for proper design of supersonic airplanes and/or missiles. It is not surprising therefore that much effort has been devoted to developing laboratory facilities in which shock and blast waves can be generated and studied in a safe way. The facilities proposed, built, and used for studying shock and blast waves include shock tubes, shock tunnels, expansion tubes, ram accelerators, light gas guns, and ballistic ranges. In the present volume a variety of experimental methods which are used in shock tubes, shock tunnels, and expansion tubes facilities is presented. Details regarding ram accelerators, light gas gun, and ballistic range facilities will appear in Volume 10. When possible, in addition to the technical description of the facility, some typical results obtained using such facilities are described. In addition to descriptions of facilities mentioned above, this book includes techniques for measuring physical properties of blast waves and electrically generated shock waves.

Information about active shock wave laboratories at different locations around the world that are not described in the following chapters is given in the appendix.

This list is far from being complete. It includes only laboratories that responded favorably to our request for information. Additional information can be obtained from the research laboratories mentioned there.

The chapters in this book were written by different authors, each an expert in the described field/technique. We would like to thank all of them for their contributions to this book. Also, special thanks are due to our wives, Heidrun and Irene, for their patience and support exhibited while we spent much time bringing the book to publication.

Beer Sheva, Israel  
Karlsruhe, Germany  
May 2015

Ozer Igra  
Friedrich Seiler

Experimental Methods of Shock Wave Research

Igra, O.; Seiler, F. (Eds.)

2016, X, 478 p. 443 illus., 232 illus. in color., Hardcover

ISBN: 978-3-319-23744-2