

Preface

The book focuses on the impact response of lightweight sandwich structures. As a kind of lightweight structure, sandwich structure has been widely used in various engineering fields, such as aerospace, ships, vehicles and so on, because of its high specific stiffness, high specific strength and versatility. During service, the sandwich structures may be subjected to various impact loads, which may result in serious damage, thereby reducing the stiffness, strength and load-bearing capacity, thereby shortening the service life and bringing safety hazards. Therefore, an in-depth understanding of impact behavior and failure mechanisms is of great significance for the wider application of sandwich structures. In the past decades, many scholars have conducted in-depth research on related topics. But it is difficult for readers to systematically read all the literature in a short time. This book seeks to succinctly summarize the development and the results achieved in this field.

This book focuses on simple, classical structures, such as beams, plates, and shells, under loads such as low-velocity impact, explosive load, and bullet penetrations. The main research methods are theoretical analysis, numerical simulation and experimental investigation. The purpose is to reveal the deep mechanism and lay a foundation for the application of sandwich structure in engineering practice.

The structure of the book is listed as follows. Chapter 1 introduces basic concepts of the cellular materials and the sandwich structures, including classification of porous materials, advantages of various porous materials, composition of the sandwich structure, and so on. Chapters 2 to 4 introduces the dynamic response and failure behavior of metal and composite sandwich structures under low-velocity impact. These chapters explore the impact behavior of sandwich beams, plates, and shells, respectively, considering various core configurations. Chapters 5 to 7 introduces dynamic response and energy absorption of sandwich structures under blast loading. The research objects are beams, plates and shells according to the order of chapters. Chapters 8 and 9 introduce the impact behavior and residual velocity of sandwich plates and sandwich shells under ballistic impact, respectively.

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