Offshore Structures, Materials and Reliability

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Preface

The contents of this book are related to offshore structures within the scope of engineering. The objectives of this book are to provide insights on offshore structures in terms of materials, analysis, and designs and to promote sustainable offshore engineering knowledge for undergraduate and postgraduate students, as well as practising offshore engineers.

This book contains seven chapters. Chapter One focuses on the materials used in offshore engineering structures, while Chapter Two deals with types of concrete utilised in various offshore applications. Chapter Three introduces ocean processes that are of interest to offshore engineers. These processes are wave hydrodynamics and ocean currents. Both regular and irregular waves are introduced along with the most commonly adopted design solutions. Chapter Four will expose readers to fixed offshore platforms after offshore engineering materials and wave hydrodynamics. This book also introduces types of fixed offshore platforms and different methods of analysis of these structures. The designs of the structural members and joints have been highlighted.

Moreover, an introduction to fatigue analysis on joints is included at the end of the chapter. With the high demands in deep water exploration and production, Chapter Five introduces floating offshore platforms. This chapter details various important components, such as structural statics and stability, dynamic motion responses, mooring, tethers, and dynamic positioning systems. Moreover, another important structure supporting offshore exploration is also introduced. Knowledge on pipeline engineering disseminated in Chapter Six of this book describes design concepts of carbon-manganese steel pipelines along with pipeline route selection and installation procedures. Problems associated with pipelines are covered in detail following explanations of some common procedures that can be adopted for repair. The last chapter covers the reliability of offshore structures theorem and methods, emphasising the probabilistic approaches.

This book is the result of a direct contribution by expert academicians in offshore engineering from the Department of Civil and Environmental Engineering, Universiti Teknologi PETRONAS (UTP), Malaysia. Among the programs that the department offers include Master of Science in Offshore Engineering, which is delivered through the Open Distance Learning (ODL) mode.

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