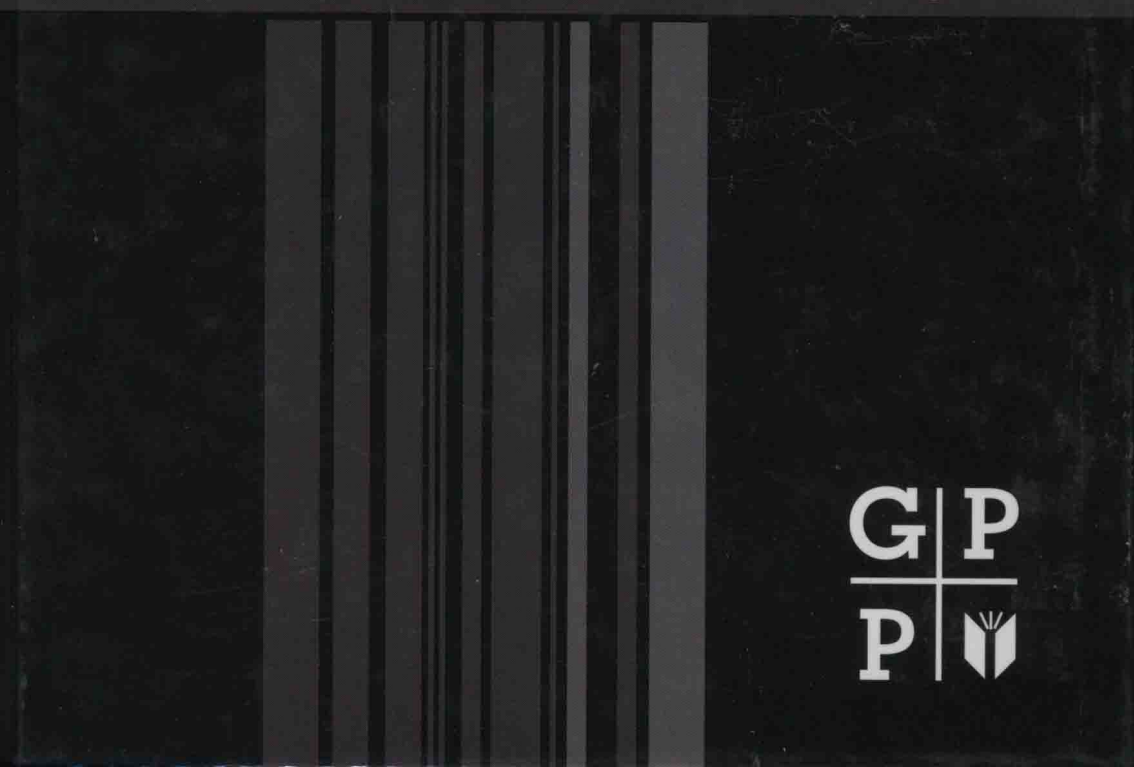
SUBSEA PIPELINE DESIGN, ANALYSIS, AND INSTALLATION

Qiang Bai and Yong Bai



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Summary: "Subsea pipelines are used for a number of purposes in the development of subsea hydrocarbon resources as shown in Figure 1.1. A pipeline system can be a single-pipe pipeline system, pipe-in-pipe or bundled system. Normally, the term of subsea flow-lines is used to describe the subsea pipelines carrying oil and gas products from the wellhead to the riser base; the riser is connected to the processing facilities (e.g. a platform or a FPSO). The subsea pipelines from the processing facilities to shore are called export pipelines, while the subsea pipelines from the platform to subsea equipment used to transfer water or chemical inhibiters are called water injection or chemical flow-lines"– Provided by publisher.
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Subsea Pipeline Design, Analysis, and Installation

Foreword

I am delighted to write a brief Foreword to this extensive handbook for subsea pipeline design and installation. It is often a challenge to find a single book that discusses all aspects of subsea pipeline design and installation in sufficient detail that the practicing engineer can have this book or volume of books as a desk reference for a large range of design topics, instead of the engineer having to search for specific subject matter in Conference Proceedings. And the authors have succeeded in accomplishing just that. The effort it took in writing well over a 750 pages of text and formulae and cross-checking was truly a labor of love and dedication to the profession of subsea pipeline engineers, and for those readers who wish to know more about a particular subject, the list of references at the end of each chapter is truly outstanding.

Frans Kopp
January 2014

Preface

It has been 8 years since our book "Subsea Pipelines and Risers" (SPR) was published by Elsevier. This new book "Subsea Pipeline Design, Analysis and Installation" reflects upon the new pipeline technologies developed by the oil and gas industry. It only concentrates on the first part of the book SPR - Subsea pipelines. All chapters in the book SPR are rewritten and updated. In addition, almost 20 new chapters are added in the new book. This new book is written for engineers who work in the field of subsea pipeline engineering.

With the rapid development of subsea pipeline engineering technology, researchers and engineers keep on exploring and advancing new design and analysis methods in this field. The limit state design technology was developed in 1990s when our first pipeline book was published based on our technical papers. All chapters have been completely revised based on our engineering practice in Houston this past decade.

The deep water pipeline technology is represented by the installation engineering required to lay the pipelines in water depth of 2000 m and deeper. Finite element analysis of pipeline dynamic nonlinear behavior becomes more and more important.

New materials are one of the new directions for pipeline technologies. The authors have been active in the qualification of composite pipelines, RTP pipelines and flexible pipelines. We have performed numerous laboratory tests for the use of new materials for subsea pipelines.

We hope that this book is a useful reference source of subsea pipeline design, analysis, and installation for subsea engineers.

The authors would like to thank our graduate students and post-doctoral fellows who provided editing assistance (Mr. Jiwei Tang, Mr. Carl Bai & Mr. Akira Bai) and initial technical writing (Mr. Jiwei Tang, Mr. Zhimeng Yu, Mr. Weiping Xu, Mr. Shuai Yuan, Mr. Yu Wang, Mr. Fan Xu, Mr. Nuosi Wang, and Ms. Binbin Yu).

Thanks to all the persons involved in reviewing and updating the book, particularly Dr. Zuyin Yang for Chapter 5 and Dr. Liyun Zhu for Chapters 7, 15, 24 to 28 and 33, and Ms. Anusha Sambamoorthy of Elsevier, who provided editory assistance.

We specially thank our families and friends for their supports. The authors would like to thank our graduate and PhD students at Zhejiang University and Harbin Engineering University, and thank Zhejiang University for their support for publishing this book.

Dr. Qiang Bai & Prof. Yong Bai
Houston, USA

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Part One

Mechanical Design