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Nota di contenuto	Foreword; Preface; Contents; 1. The Human Context; 1.1 Introduction; 1.2 The Peoples Native to the Arctic; 1.3 Explorers; 1.4 Developers; 1.5 Outsiders; Conclusion; References; 2. The Physical and Biological Environment; 2.1 Climate; 2.2 Permafrost and Land Ice; 2.3 Sea Ice; 2.3.1 Introduction; 2.3.2 Oceanographic Context; 2.3.3 The Structure of Ice; 2.3.4 Ice Formation; 2.4 Gathering Data about Sea Ice; 2.4.1 Identifying Needs; 2.4.2 Planning; 2.4.3 Methods for Ice Thickness; 2.4.4 Ice Movement; 2.4.5 Ice Strength and Related Parameters; 2.5 Biology; References; 3. Ice Mechanics 3.1 Introduction 3.2 Creep; 3.3 Fracture; 3.3.1 Introduction; 3.3.2 Linear Elastic Fracture Mechanics; 3.3.3 Nonlinear Fracture Mechanics; 3.4 Elasticity; 3.5 Plasticity; 3.6 Broken Ice; 3.7 In-situ Rubble Tests; 3.7.1 Overview; 3.7.2 The Direct Shear Test; 3.7.3 The Punch Shear Test; 3.7.4 The Pull Up Test; 3.7.5 Summary of Results of in-situ Tests; Pull up strengths; Punch and direct shear strengths; 3.7.6 Translation of Rubble Shear Strength into a Bearing Pressure (or pseudo crushing strength); 3.7.7 Confined Compression Test (indentation test) on Ice Rubble; 3.8 Model Ice; References

4. Ice Forces on Structures in the Sea4.1 Introduction; 4.2 Alternative Design Concepts; 4.3 Ice Forces; 4.4 Ice Forces on Vertical-sided Structures; 4.4.1 Alternative Modes; 4.4.2 Creep; 4.4.3 Buckling; 4.4.4 Crushing: A Simple but Incorrect Approach; 4.4.5 Crushing: Evidence from Measurements; 4.4.6 Crushing: Empirical Representations of the Data; 4.4.7 Crushing: Theory; 4.5 Sloping-sided Structures; 4.5.1 Introduction; 4.5.2 Mechanics of Ice Interaction with Sloping-sided Structures; 4.5.3 Adfreeze Effects; 4.5.4 Experimental and Full Scale Data; 4.5.5 Modifications for very Thick Ice
4.5.6 Velocity Effects4.6 Local Ice Pressures; 4.7 Ice Encroachment; 4.8 Model Tests; 4.9 Ice-induced Vibrations; 4.10 Ice Load Measurements on Platforms; Instrumenting the surrounding ice; Measuring ice deceleration; Foundation response; Structure response using strain gauges; Structure response using extensometers; Structure response using accelerometers; Structure/foundation response using tiltmeters; Ice load cells and panels at the interface between ice and structure; References; 5. Broken Ice, Pressure Ridges and Ice Rubble; 5.1 Introduction; 5.2 Formation of Ridges
Case 1: Ice fails and ramps downwardCase 2: Ice fails and rides upwards; Case 3: Ice rubble failure; 5.3 Limit- Force Calculations; 5.4 Multi-Year Ridges; 5.4.1 Introduction; 5.4.2 Ridge Breaking Analysis; 5.5 Loads due to First-year Ridges; 5.5.1 Introduction; 5.5.2 Ridge Interaction with Vertical Structures; 5.5.3 First-year Ridge Interaction on Upward Sloping Structures; 5.5.4 First Year Ridge Interaction on Downward Sloping Structures; 5.6 Structures in Shallow Water; 5.6.1 Effects of Ice Rubble on Ice Loads; 5.6.2 First-year Ridge Loads in Shallow Water
5.7 Multi-leg and Multi-hulled Platforms

Sommario/riassunto

There is an increasing need to construct engineering structures in the Arctic seas. The requirement is principally generated by the oil and gas industry, because of the substantial reserves that are known to exist offshore in the Beaufort Sea, the Caspian Sea, the Barents Sea, the Pacific Ocean off the coast of Sakhalin, the Canadian Arctic, and almost certainly elsewhere. Structures have to withstand the severe environmental forces generated by sea ice, a subject that is developing rapidly but is still far from completely understood. Underwater pipelines have to be safe against ice gouging an

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