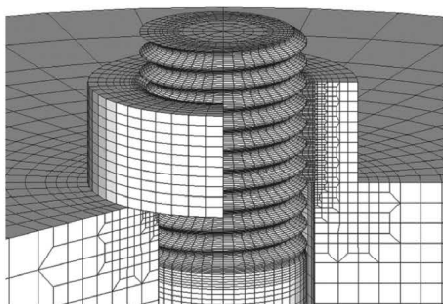




# 技術者のための ねじの力学

— 材料力学と数値解析で解き明かす —

工学博士 福岡俊道 著



コロナ社

## 技術者のためのねじの力学

— 材料力学と数値解析で解き明かす —

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### 【本書の特徴】

ねじの幾何学、締結部剛性、締め付け特性、静的強度と疲労強度、熱負荷に対する挙動、固有振動特性などを平易に解説し、材料力学と標準的なCAE手法による“壊れないねじ締結部設計”に必要な基礎知識の提供を目的としています。

### 【主要目次】

- 1 ねじの規格と種類 (ねじ山の形状と使用目的/ねじの規格/ねじのピッチと条数 など)
- 2 ねじの基本 (ねじの強度/ねじの剛性/ねじの真の断面形状/ねじの真の断面積 など)
- 3 ねじの締め付けの力学 (各種締め付け方法とその特性比較/トルク法/弾性域回転角法/張力法/熱膨張法/ねじの締め付けに要するエネルギー)
- 4 ねじの静的強度と疲労強度 (はめあいねじ部の荷重分布とねじ山荷重分担率/ねじの静的強度と応力集中/ねじの疲労破壊/ねじの疲労強度の評価方法 など)
- 5 熱負荷を受けるボルト締結体 (ボルト締結体の熱・力学挙動の基礎/接触面を伝わる熱の評価方法/小さなすきまを流れる熱の評価方法/ねじの焼き付き)
- 6 ねじのゆるみ (回転ゆるみと非回転ゆるみ/ゆるみが発生しやすい締結部 など)
- 7 管フランジ締結体の熱・力学挙動 (管フランジ締結体固有の力学特性と熱挙動/ガスケットの圧縮特性とフランジローテーション など)
- 8 ねじのトラブル事例から学ぶ - 原因の究明と解決策 - (JIS方式大型車ホイールボルトの構造と疲労破壊/せん断荷重を受ける多数ボルト締結体の力学特性 など)

# THE MECHANICS OF THREADED FASTENERS AND BOLTED JOINTS FOR ENGINEERING AND DESIGN

Toshimichi Fukuoka

*The Mechanics of Threaded Fasteners and Bolted Joints for Engineering and Design* outlines how threaded fasteners and bolted joints fail, how these failures can be remedied, and ultimately how to avoid them altogether through tightening methods, material strength, and avoiding loosening. The book demonstrates how to select the appropriate tightening method and determine the optimal tightening procedure for varying nominal diameters. Using the finite element method, it discusses characteristics of stress concentration and fatigue strength and covers bolt force variation due to elastic interaction. The separation of the plate interface via increased external force as the primary cause of fatigue failure in threaded fasteners is discussed, with effective countermeasures provided. Empirical equations of the thermal contact coefficient and apparent thermal contact coefficient in simple form are included as well.

## Key Features

- Outlines various tightening methods such as torque control, angle control, direct tension, and thermal expansion
- Demonstrates methods for preventing fatigue failure
- Discusses the effect of high- and low-temperature thermal loads on the strength of bolted joints by looking at thermal contact resistance at the interface

## About the Author

**Toshimichi Fukuoka** is a Professor Emeritus at Kobe University, Japan, and conducts research in the areas of numerical analysis and experimental study of thermal and mechanical behavior of bolted joints, application of computational mechanics to structural design and safety assessment, study of thermal contact resistance and interface stiffness, and inverse problems in contact mechanics and heat transfer phenomena.



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