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The Anisotropic Property of Uniaxial PVDF Film and Its Influence on Sensor Applications; 3.6 The Anisotropic Property of Biaxial PVDF Film and Its Influence on Sensor Applications; 3.7 Characterization of Sandwiched Piezoelectric PVDF Films; 3.8 Finite Element Analysis of Sandwiched PVDF; 3.8.1 Uniaxial PVDF Film; 3.8.2 Biaxial PVDF Film; 3.9 Experiments; 3.9.1 Surface Friction Measurement; 3.9.2 Experiments Performed on Sandwiched PVDF for Different Surface Roughness; 3.10 Discussion and Conclusions; References Chapter 4 Design, Analysis, Fabrication, and Testing of Tactile Sensors4.1 Endoscopic Force Sensor: Sensor Design; 4.1.1 Modeling; 4.1.2 Sensor Fabrication; 4.1.3 Experimental Analysis; 4.2 Multi-Functional MEMS-Based Tactile Sensor: Design, Analysis, Fabrication, and Testing; 4.2.1 Sensor Design; 4.2.2 Finite Element Modeling; 4.2.3 Sensor Fabrication; 5.3 Method; 4.2.4 Sensor Assembly; 4.2.5 Testing and Validation: Softness Characterization; References; Chapter 5 Bulk Softness Measurement Using a Smart Endoscopic Grasper; 5.1 Introduction; 5.2 Problem Definition; 5.4 Energy and Steepness 5.5 Calibrating the Grasper5.6 Results and Discussion; References; Chapter 6 Lump Detection; 6.1 Introduction; 6.2 Constitutive Equations for Hyperelasticity; 6.2.1 Hyperelastic Relationships in Uniaxial Loading; 6.3 Finite Element Modeling; 6.4 The Parametric Study; 6.4.1 The Effect of Lump Size; 6.4.2 The Effect of Depth; 6.4.3 The Effect of Applied Load; 6.4.4 The Effect of Lump Stiffness; 6.5 Experimental Validation; 6.6 Discussion and Conclusions; References; Chapter 7 Tactile Display Technology; 7.1 The Coupled Nature of the Kinesthetic and Tactile Feedback; 7.2 Force-Feedback Devices 7.3 A Review of Recent and Advanced Tactile Displays

Sommario/riassunto

Comprehensively covers the key technologies for the development of tactile perception in minimally invasive surgery. Covering the timely topic of tactile sensing and display in minimally invasive and robotic surgery, this book comprehensively explores new techniques which could dramatically reduce the need for invasive procedures. The tools currently used in minimally invasive surgery (MIS) lack any sort of tactile sensing, significantly reducing the performance of these types of procedures. This book systematically explains the various technologies which the most prominent researchers
