

Contents

Pumps and Pipes: The Concept	xi
Part I Collaboration and Solution	
1 Pipeline to Circulation: The Story of the Kimray–Greenfield Inferior Vena Caval Filter	3
Mark G. Davies	
Part II Automation and Robotics	
2 Oilfield Automation	9
Rustom K. Mody and Edward O’Malley	
3 Robot-Assisted Procedures with MRI Guidance	21
Mark G. Davies, Nikolaos V. Tsekos, and Erol Yenziaras	
4 Surgical Robotics: Innovations, Development, and Shortcomings	33
Jean Bismuth and Marcia K. O’Malley	
Part III Pumps and Flow	
5 Remarks on Solution Verification and Model Validation of Hemodynamic Simulations	45
Marc Garbey and Mark G. Davies	
6 Cardiac Assist Devices	55
Basel Ramlawi	
7 Multilateral Wells: Maximizing Well Productivity	71
Rustom K. Mody and Martin P. Coronado	

Part IV Rust and Rupture

- 8 Rust and Rupture: Atherosclerosis** 89
Justin T. Saunders and Christie M. Ballantyne
- 9 Atherectomy and Plaque Analysis**..... 99
Nyla Ismail and Eric K. Peden
- 10 Stitches, Glues, and Staples**..... 105
Kim I. de la Cruz and William E. Cohn

Part V Navigating and Imaging

- 11 Imaging and Navigation** 115
Alan B. Lumsden
- 12 Intravascular Imaging**..... 133
Daynene Vykoukal and Mark G. Davies
- 13 Optical 3D Deformation and Strain Measurement**..... 147
John Tyson II
- 14 Nanoscale Imaging of 3D Surfaces and Interfaces**..... 165
Dalia G. Yablon and Alan M. Schilowitz
- 15 Biomedical Computing in Complex Advanced Systems**..... 177
Ioannis A. Kakadiaris and Shishir K. Shah

Part VI Cells and Nanotechnology

- 16 Developing a Stable Diabetic Model for Human Islet
Assessment in the NOD-*scid* Mouse** 193
Daniel W. Fraga and A. Osama Gaber
- 17 Nanotechnology for Various Applications:
Materials, Environmental and Medical** 203
Cumaraswamy Vipulanandan

Part VII Unifying Oil and Medicine

- 18 Feasibility Study of Pumps and Pipes:
Paving the Path from Oilfield to Operating Room** 221
X. Shelley Cao, Sarah Hernandez, Bryan Luce, Marcus Owens,
Meredith Williams, and Mark G. Davies
- Index**..... 251