SOFA: A Multi-Model Framework for Interactive
Physical Simulation

#	Paper	IF	Citations
178	CamiTK: A Modular Framework Integrating Visualization, Image Processing and Biomechanical Modeling. *Studies in Mechanobiology, Tissue Engineering and Biomaterials*, **2012**, 323-354	0.5	15
177	Generation of synthetic but visually realistic time series of cardiac images combining a biophysical model and clinical images. **2013**, 32, 99-109		28
176	Image-guided simulation of heterogeneous tissue deformation for augmented reality during hepatic surgery. **2013**,		73
175	Control of elastic soft robots based on real-time finite element method. **2013**,		118
174	Design of a haptic simulator framework for modelling surgical learning systems. **2013**,		3
173	Middle-ear microsurgery simulation to improve new robotic procedures. **2014**, 2014, 891742		10
172	Physics-based shape matching for intraoperative image guidance. **2014**, 41, 111901		52
171	Single view augmentation of 3D elastic objects. **2014**,		28
170	Validation method of a middle ear mechanical model to develop a surgical simulator. **2014**, 19, 73-84		9
169	Parallel Shortest Path Algorithm for Voronoi Diagrams with Generalized Distance Functions. **2014**,		1
168	Cardiac electrophysiological activation pattern estimation from images using a patient-specific database of synthetic image sequences. **2014**, 61, 235-45		15
167	Augmented Reality during Cutting and Tearing of Deformable Objects. **2015**,		8
166	Real-time tracking of 3D elastic objects with an RGB-D sensor. **2015**,		31
165	A Survey of Physically Based Simulation of Cuts in Deformable Bodies. *Computer Graphics Forum*, **2015**, 34, 161-187	2.4	46
164	Effects of sound on visual realism perception and task performance. **2015**, 31, 1207-1216		7
163	Minimally Supervised Segmentation and Meshing of 3D Intervertebral Discs of the Lumbar Spine for Discectomy Simulation. **2015**, 143-155		2
162	Virtual cutting of deformable objects based on efficient topological operations. **2015**, 31, 831-841		28

161   Aggregate Constraints for Virtual Manipulation with Soft Fingers. **2015**, 21, 452-61   22

160   Tracking Fractures of Deformable Objects in Real-Time with an RGB-D Sensor. **2015**,   6

159   Towards an efficient data assimilation in physically-based medical simulations. **2015**,

158   A computational framework for 3D mechanical modeling of plant morphogenesis with cellular resolution. **2015**, 11, e1003950   88

157   Registration by interactive inverse simulation: application for adaptive radiotherapy. *International Journal of Computer Assisted Radiology and Surgery*, **2015**, 10, 1193-200   3.9   4

156   Multi-model groundwater-management optimization: reconciling disparate conceptual models. **2015**, 23, 1067-1087   7

155   Monocular 3D Reconstruction and Augmentation of Elastic Surfaces with Self-Occlusion Handling. **2015**, 21, 1363-76   16

154   3D lumbar spine intervertebral disc segmentation and compression simulation from MRI using shape-aware models. *International Journal of Computer Assisted Radiology and Surgery*, **2015**, 10, 45-54   3.9   22

153   Deformable mesh simulation for virtual laparoscopic cholecystectomy training. **2015**, 31, 485-495   8

152   A Mechanical Model to Interpret Cell-Scale Indentation Experiments on Plant Tissues in Terms of Cell Wall Elasticity and Turgor Pressure. **2016**, 7, 1351   14

151   Computational Modeling of Auxin: A Foundation for Plant Engineering. **2016**, 7, 1881   7

150   Framework for online simulation of soft robots with optimization-based inverse model. **2016**,   14

149   Patient specific corotated FEM simulation and gelatin phantom for prostate brachytherapy. **2016**,   2

148   A new ChainMail approach for real-time soft tissue simulation. **2016**, 7, 246-52   18

147   Impact of Visual-Haptic Spatial Discrepancy on Targeting Performance. **2016**, 46, 1098-1108   6

146   Optimization-Based Inverse Model of Soft Robots With Contact Handling. *IEEE Robotics and Automation Letters*, **2017**, 2, 1413-1419   4.2   38

145   Comprehensive preclinical evaluation of a multi-physics model of liver tumor radiofrequency ablation. *International Journal of Computer Assisted Radiology and Surgery*, **2017**, 12, 1543-1559   3.9   9

144   Software toolkit for modeling, simulation, and control of soft robots. **2017**, 31, 1208-1224   72

143	Haptic devices synchronization into a software simulator. **2017**,		
142	Robust augmented reality registration method for localization of solid organs' tumors using CT-derived virtual biomechanical model and fluorescent fiducials. **2017**, 31, 2863-2871		43
141	Soft Robot Modeling, Simulation and Control in Real-Time. **2017**, 103-109		17
140	SmartSIM - a virtual reality simulator for laparoscopy training using a generic physics engine. **2017**, 13, e1771		2
139	Visual servoing control of soft robots based on finite element model. **2017**,		15
138	Real-time simulation of hydraulic components for interactive control of soft robots. **2017**,		5
137	Deformable Models for Surgical Simulation: A Survey. **2018**, 11, 143-164		50
136	Fast image-based mitral valve simulation from individualized geometry. **2018**, 14, e1880		5
135	Finite Element Method-Based Kinematics and Closed-Loop Control of Soft, Continuum Manipulators. **2018**, 5, 348-364		45
134	Energy propagation modeling of nonlinear soft tissue deformation for surgical simulation. **2018**, 94, 3-10		8
133	Capturing Deformations of Interacting Non-rigid Objects Using RGB-D Data. **2018**,		11
132	Control of an Iguana Character Using Soft-Body Simulation. *IEEE Access*, **2018**, 6, 77931-77939	3.5	0
131	FEM-Based Deformation Control for Dexterous Manipulation of 3D Soft Objects. **2018**,		16
130	A V-REP Simulator for the da Vinci Research Kit Robotic Platform. **2018**,		21
129	Model-Based Generation of Synthetic 3D Time-Lapse Sequences of Multiple Mutually Interacting Motile Cells with Filopodia. *Lecture Notes in Computer Science*, **2018**, 71-79	0.9	0
128	A Novel Haptic Interactive Approach to Simulation of Surgery Cutting Based on Mesh and Meshless Models. **2018**, 2018, 9204949		9
127	FiloGen: A Model-Based Generator of Synthetic 3-D Time-Lapse Sequences of Single Motile Cells With Growing and Branching Filopodia. **2018**, 37, 2630-2641		16
126	Evolving Soft Locomotion in Aquatic and Terrestrial Environments: Effects of Material Properties and Environmental Transitions. **2018**, 5, 475-495		27

125	Virtual Simulation of Brain Sylvian Fissure Exploration and Aneurysm Clipping with Haptic Feedback for Neurosurgical Training. *Lecture Notes in Computer Science*, **2018**, 230-238	0.9	2
124	A modular and generic virtual reality training framework for micro-robotic cell injection systems. **2018**,		0
123	Soft robots locomotion and manipulation control using FEM simulation and quadratic programming. **2019**,		14
122	Toward Shape Optimization of Soft Robots. **2019**,		8
121	Multi-DoF Force Characterization of Soft Actuators. *IEEE Robotics and Automation Letters*, **2019**, 4, 3679-3686	4.6	8
120	New Techniques for Combined FEM-Multibody Anatomical Simulation. **2019**, 75-92		1
119	Position-based modeling of lesion displacement in ultrasound-guided breast biopsy. *International Journal of Computer Assisted Radiology and Surgery*, **2019**, 14, 1329-1339	3.9	9
118	Calibration and External Force Sensing for Soft Robots Using an RGB-D Camera. *IEEE Robotics and Automation Letters*, **2019**, 4, 2356-2363	4.2	5
117	. *IEEE Access*, **2019**, 7, 46306-46316	3.5	2
116	An Interactive Physically-based Model for Active Suction Phenomenon Simulation. **2019**,		2
115	A Penetration Metric for Deforming Tetrahedra using Object Norm. **2019**,		
114	VR Props: An End-to-End Pipeline for Transporting Real Objects Into Virtual and Augmented Environments. **2019**,		2
113	Tracking of Non-Rigid Objects using RGB-D Camera. **2019**,		3
112	Fast simulation of stent deployment with plastic beam elements. **2019**, 2019, 6968-6974		1
111	Regulation of plant cell wall stiffness by mechanical stress: a mesoscale physical model. **2019**, 78, 625-653		12
110	Accurate coarse soft tissue modeling using FEM-based fine simulation. **2020**, 79, 7121-7134		0
109	Simultaneous Tracking and Elasticity Parameter Estimation of Deformable Objects. **2020**,		2
108	Mechanism and Model of a Soft Robot for Head Stabilization in Cancer Radiation Therapy. **2020**, 2020, 4609-4615		1

107	Active Deformation through Visual Servoing of Soft Objects. **2020**,		2
106	Dynamic Cloth Manipulation with Deep Reinforcement Learning. **2020**,		15
105	Distant Collision Response in Rigid Body Simulations. *Computer Graphics Forum*, **2020**, 39, 113-122	2.4	
104	Biomechanical modelling of probe to tissue interaction during ultrasound scanning. *International Journal of Computer Assisted Radiology and Surgery*, **2020**, 15, 1379-1387	3.9	3
103	Kinematics of Soft Robots by Geometric Computing. **2020**, 36, 1272-1286		11
102	Influence of sampling accuracy on augmented reality for laparoscopic image-guided surgery. **2021**, 30, 229-238		7
101	Finite Element Modeling in the Design Process of 3D Printed Pneumatic Soft Actuators and Sensors. **2020**, 9, 52		22
100	Real-time visual and physical cutting of a meshless model deformed on a background grid. **2020**, 31, e1929		3
99	Augmented Reality during Open Liver Surgery Using a Markerless Non-rigid Registration System. **2021**, 25, 662-671		15
98	Finite Element Modeling of Soft Fluidic Actuators: Overview and Recent Developments. **2021**, 3, 2000187		33
97	On the use of simulation in robotics: Opportunities, challenges, and suggestions for moving forward. **2021**, 118,		21
96	Predicted Microscopic Cortical Brain Images for Optimal Craniotomy Positioning and Visualization. **2020**, 9, 407-413		1
95	The softness distribution index: towards the creation of guidelines for the modeling of soft-bodied robots. **2021**, 40, 197-223		4
94	AFSIM⊠ pseudo-realtime hybrid simulation software design. 154851292098526		
93	A Review of 3D-Printable Soft Pneumatic Actuators and Sensors: Research Challenges and Opportunities. **2021**, 3, 2000223		19
92	Design of a Multifunctional Operating Station Based on Augmented Reality (MOSAR). **2021**, 21, 119-136		0
91	Training Simulators for Gastrointestinal Endoscopy: Current and Future Perspectives. **2021**, 13,		2
90	. **2021**,		2

89	BVPy: A FEniCS-based Python package to ease the expression and study of boundary value problems in Biology.. **2021**, 6, 2831		
88	Data-Driven Intra-Operative Estimation of Anatomical Attachments for Autonomous Tissue Dissection. *IEEE Robotics and Automation Letters*, **2021**, 6, 1856-1863	4.2	4
87	Toward next-generation learned robot manipulation. *Science Robotics*, **2021**, 6,	18.6	9
86	Modeling, learning, perception, and control methods for deformable object manipulation. *Science Robotics*, **2021**, 6,	18.6	16
85	Real-Time Deformation Simulation of Kidney Surgery Based on Virtual Reality. **2021**, 26, 290-297		
84	A rigged model of the breast for preoperative surgical planning. **2021**, 128, 110645		2
83	Improving Hexahedral-FEM-Based Plasticity in Surgery Simulation. *Lecture Notes in Computer Science*, **2021**, 571-580	0.9	0
82	Intra-operative Update of Boundary Conditions for Patient-Specific Surgical Simulation. *Lecture Notes in Computer Science*, **2021**, 373-382	0.9	2
81	Physics-Based Deep Neural Network for Real-Time Lesion Tracking in Ultrasound-Guided Breast Biopsy. **2020**, 33-45		7
80	Dynamic Cutting of a Meshless Model for Interactive Surgery Simulation. *Lecture Notes in Computer Science*, **2020**, 114-130	0.9	1
79	Real-time muscle deformation via decoupled modeling of solid and muscle fiber mechanics. *Lecture Notes in Computer Science*, **2014**, 17, 65-72	0.9	2
78	A Material-Based Model for the Simulation and Control of Soft Robot Actuator. *Lecture Notes in Computer Science*, **2017**, 557-569	0.9	1
77	From Generic to Specific Musculoskeletal Simulations Using an Ontology-Based Modeling Pipeline. *Studies in Computational Intelligence*, **2013**, 227-242	0.8	3
76	Towards a better understanding of pelvic system disorders using numerical simulation. *Lecture Notes in Computer Science*, **2013**, 16, 307-14	0.9	6
75	A microtubule-mediated mechanical feedback controls leaf blade development in three dimensions.		2
74	Modelling the Soft Robot Kyma Based on Real-Time Finite Element Method. *Computer Graphics Forum*, **2020**, 39, 289-302	2.4	1
73	MOOSE-Based Finite Element Hyperelastic Modeling for Soft Robot Simulations. *IEEE Access*, **2021**, 9, 139627-139635	3.5	1
72	A Dynamics Simulator for Soft Growing Robots*. **2021**,		1

71	Learning Shape Control of Elastoplastic Deformable Linear Objects. **2021**,		1
70	Real-to-Sim Registration of Deformable Soft Tissue with Position-Based Dynamics for Surgical Robot Autonomy. **2021**,		6
69	Visual Tracking of Deforming Objects Using Physics-based Models. **2021**,		
68	Soft Robot Optimal Control Via Reduced Order Finite Element Models. **2021**,		2
67	ReForm: A Robot Learning Sandbox for Deformable Linear Object Manipulation. **2021**,		0
66	Registration of a validated mechanical atlas of middle ear for surgical simulation. *Lecture Notes in Computer Science*, **2013**, 16, 331-8	0.9	1
65	Towards Automatic Path Planning for Multi-port Minimally-Traumatic Lateral Skull Base Surgery. *Lecture Notes in Computer Science*, **2013**, 59-66	0.9	1
64	Path Planning for Multi-port Lateral Skull Base Surgery Based on First Clinical Experiences. *Lecture Notes in Computer Science*, **2014**, 23-30	0.9	
63	Path Planning for Multi-port Lateral Skull Base Surgery Based on First Clinical Experiences. *Lecture Notes in Computer Science*, **2014**, 23-30	0.9	
62	Computational Image-Guided Technologies in Cranio-Maxillofacial Soft Tissue Planning and Simulation. **2016**, 43-56		
61	An Immersed Boundary Method for Detail-Preserving Soft Tissue Simulation from Medical Images. **2019**, 55-67		
60	Simulation of Balloon-Expandable Coronary Stent Apposition with Plastic Beam Elements. *Lecture Notes in Computer Science*, **2019**, 191-199	0.9	
59	Reinforcement Learning of Musculoskeletal Control from Functional Simulations. *Lecture Notes in Computer Science*, **2020**, 135-145	0.9	
58	Autonomous guidewire navigation in a two dimensional vascular phantom. *Current Directions in Biomedical Engineering*, **2020**, 6,	0.5	4
57	Modeling and Simulation of Hybrid Soft Robots Using Finite Element Methods: Brief Overview and Benefits. *Springer Proceedings in Advanced Robotics*, **2021**, 335-340	0.6	2
56	A Virtual Reality Surgical Training System for Office Hysteroscopy with Haptic Feedback: A Feasibility Study. *Lecture Notes in Computer Science*, **2020**, 115-127	0.9	0
55	Experimental Results for Haptic Interaction With Virtual Holonomic and Nonholonomic Constraints. *IEEE Access*, **2020**, 8, 120959-120973	3.5	0
54	Management of Soft Agents with Structural Uncertainty. **2021**, 31-53		

53	Application of SOFA Framework for Physics-Based Simulation of Deformable Human Anatomy of Nasal Cavity. *IFMBE Proceedings*, **2021**, 112-120	0.2	1
52	An Accelerated Error Convergence Design Criterion and Implementation of Lebesgue-p Norm ILC Control Topology for Linear Position Control Systems. *Mathematical Problems in Engineering*, **2021**, 2021, 1-12	1.1	4
51	FEA-Based Inverse Kinematic Control: Hyperelastic Material Characterization of Self-Healing Soft Robots. *IEEE Robotics and Automation Magazine*, **2021**, 2-12	3.4	2
50	Piston-Driven Pneumatically-Actuated Soft Robots: Modeling and Backstepping Control. **2022**, 6, 1837-1842		3
49	Leveraging Multiple Environments for Learning and Decision Making: a Dismantling Use Case. **2020**,		0
48	SoMo: Fast and Accurate Simulations of Continuum Robots in Complex Environments. **2021**,		3
47	Turning an Articulated 3-PPSR Manipulator into a Parallel Continuum Robot. **2021**,		
46	Cooperative Assistance in Robotic Surgery through Multi-Agent Reinforcement Learning. **2021**,		1
45	Shape-centric Modeling for Soft Robot Inchworm Locomotion.		1
44	Dynamics Computation of a Hybrid Multi-link Humanoid Robot Integrating Rigid and Soft Bodies. **2021**,		0
43	Dynamic Grasping with a "Soft" Drone: From Theory to Practice. **2021**,		3
42	Contact Tracing: A Low Cost Reconstruction Framework for Surface Contact Interpolation. **2021**,		0
41	Mobile 3D Printing Robot Simulation with Viscoelastic Fluids. **2021**,		0
40	Deformation-Aware Data-Driven Grasp Synthesis. *IEEE Robotics and Automation Letters*, **2022**, 7, 3038-3045	4.6	3
39	Visual Haptic Feedback for Training of Robotic Suturing.. *Frontiers in Robotics and AI*, **2022**, 9, 800232	2.8	1
38	SoMoGym: A toolkit for developing and evaluating controllers and reinforcement learning algorithms for soft robots. *IEEE Robotics and Automation Letters*, **2022**, 1-1	4.2	1
37	Non-rigid Tracking Using RGB-D Data. *Springer Tracts in Advanced Robotics*, **2022**, 19-72	0.5	
36	Task-oriented Hierarchical Control of Modular Soft Robots with External Vision Guidance. *Journal of Bionic Engineering*, **2022**, 19, 657	2.7	0

35	Inverse deformation analysis: an experimental and numerical assessment using the FEniCS Project. *Engineering With Computers*, 1	4.5	0
34	Simulation Data Driven Design Optimization for Reconfigurable Soft Gripper System. *IEEE Robotics and Automation Letters*, **2022**, 7, 5803-5810	4.2	0
33	Deep learning for biomechanical modeling of facial tissue deformation in orthognathic surgical planning.. *International Journal of Computer Assisted Radiology and Surgery*, **2022**, 1	3.9	2
32	Simulation of Solid Meal Digestion in a Soft Gastric Robot using SOFA. **2021**,		1
31	A Proposal of Haptic Technology to be Used in Medical Simulation.		
30	Toward a Digital Twin for Arthroscopic Knee Surgery: A Systematic Review. *IEEE Access*, **2022**, 10, 45029-45052	3.5	1
29	Simulating Electrohydraulic Soft Actuator Assemblies Via Reduced Order Modeling. **2022**,		1
28	Learning-based autonomous vascular guidewire navigation without human demonstration in the venous system of a porcine liver. *International Journal of Computer Assisted Radiology and Surgery*,	3.9	
27	Soft Pneumatic Actuators: A Review of Design, Fabrication, Modeling, Sensing, Control and Applications. *IEEE Access*, **2022**, 1-1	3.5	7
26	Deliberation in autonomous robotic surgery: a framework for handling anatomical uncertainty. **2022**,		1
25	Fully body visual self-modeling of robot morphologies. *Science Robotics*, **2022**, 7,	18.6	3
24	A Simulation Framework for Magnetic Continuum Robots. *IEEE Robotics and Automation Letters*, **2022**, 7, 8370-8376	4.2	3
23	Haptic Interfaces. **2022**, 63-74		
22	Constraint-based Simulation of Passive Suction Cups.		1
21	An In-Office Hysteroscopy VR/Haptic Simulation Platform for Training in Spatial Navigation and Passage of the Cervical Canal. **2022**, 4, 608-620		1
20	Growth of Simulated Tumors Under the Influence of Oxygen Supply. **2022**, 55, 653-658		0
19	Deep Learning-Based Facial Appearance Simulation Driven by Surgically Planned Craniomaxillofacial Bony Movement. **2022**, 565-574		0
18	Geometric Mapping Evaluation for Real-Time Local Sensor Simulation. **2022**,		0

17	Plastic hexahedral FEM for surgical simulation.	o
16	Design of personalized scoliosis braces based on differentiable biomechanics Synthetic study. 10,	o
15	Sim-to-Real Transfer for Visual Reinforcement Learning of Deformable Object Manipulation for Robot-Assisted Surgery. **2023**, 8, 560-567	o
14	Large-Dimensional Multibody Dynamics Simulation Using Contact Nodalization and Diagonalization. **2022**, 1-20	o
13	Haptic Rendering of Soft Object Interaction for Robot-aided Neurorehabilitation. **2022**,	o
12	SofaGym: An Open Platform for Reinforcement Learning Based on Soft Robot Simulations.	1
11	Towards a Physics-Based Model for Steerable Eversion Growing Robots. **2023**, 8, 1005-1012	1
10	Sim-to-Real Transfer of Image-Based Autonomous Guidewire Navigation Trained by Deep Deterministic Policy Gradient with Behavior Cloning for Fast Learning. **2022**,	o
9	Planar Modeling and Sim-to-Real of a Tethered Multimaterial Soft Swimmer Driven by Peano-HASELs. **2022**,	2
8	A Novel Simulation-Based Quality Metric for Evaluating Grasps on 3D Deformable Objects. **2022**,	o
7	GESRsim: Gastrointestinal Endoscopic Surgical Robot Simulator. **2022**,	o
6	Manipulating Constrained Soft Tissue while Avoiding Obstacles using Reinforcement Learning with Self-Attention. **2022**,	o
5	Sim-to-Real Surgical Robot Learning and Autonomous Planning for Internal Tissue Points Manipulation Using Reinforcement Learning. **2023**, 8, 2502-2509	o
4	Concept for a Reinforcement Learning Approach to Navigate Catheters Through Blood Vessels. **2022**,	o
3	New Trends in Surgical Education and Mentoring by Immersive Virtual Reality: An Innovative Tool for Patients Safety. **2023**, 657-667	o
2	Adaptive control of a soft pneumatic actuator using experimental characterization data. 10,	o
1	Kinetostatic Modeling of Soft Robots: Energy-Minimization Approach and 99-Line MATLAB Implementation.	o