

Author Index

- Ameri, F., 443
- Bartholomew, A., 47
Bordegoni, M., 239
- Chen, Y., 377
Colombo, H., 261
Crowder, R. M., 411
Cruz-Neira, C., 557
Cugini, U., 239
- Demoly, F., 289
Dumont, G., 507
- Eynard, B., 289
- Falcidieno, B., 317
Ferrise, F., 239
Fletcher, C., 530
- Gerritsen, B. H. M., 183
Giannini, F., 317
Gomes, S., 289
Gonzalez, G., 530
- Herbert, L., 469
Hermanson, J. C., 73
Heyn, T., 47
Horváth, I., 183
Huang, P., 377
- Iliopoulos, A., 73, 97
- Jayakumar, P., 47
- Kiritsis, D., 289
Kosmadoudi, Z., 530
- Léon, J.C., 317
Le, Q., 155
Lim, T., 530
Liu, Y., 530
Luo, Y., 125
- Mazhar, H., 47
Medellin, H., 530
Melanz, D., 47
Michopoulos, J. G., 73, 97
- Negrut, D., 47
- Neumann, C. P., 557
- Opiyo, E. Z., 183
- Panchal, J. H., 155
Pazouki, A., 47
Pernot, J.P., 317
Pontonnier, C., 507
- Regazzoni, D., 261
Reiners, D., 557
Ritchie, J. M., 530
Rizzi, C., 261
Rusák, Z., 183
- Sharp, R., 469
Shea, K., 443
Sivanathan, A., 530
Song, Y., 183
Springer, J. P., 557
Steuben, J., 345
Sung, R., 530
Suresh, K., 29
- Tasora, A., 47
Turner, C., 345
- van der Vegte, W. F., 183
Vergeest, J. S. M., 183
Verlinden, J. C., 183
Vroom, R. W., 183
- Wang, C. C. L., 377
Wang, Y., 1
Wang, Z., 507
Wendrich, R. E., 215
- Yan, X.T., 289

Keyword Index

- assembly and assembly planning
 - haptics, 539
- 3-D CAD, 218
- 3-D display, 185
- 3-D scene, 186
- 3-D visualization system, 185
- 3-D workspaces, 184
- 6-DoF loader, 74

- patient's avatar, 280

- ab initio, 5
- ACLVDT, 76
- actuators, 75
- Adaptive NN-FEM, 141
- adaptive NN-FEM, 143
- adaptive sequential sampling, 349
- adjacency, 126–128
- adjoint field, 34
- admissible assembly sequences, 290
- advanced design support, 187
- aesthetic design, 336
- aesthetics, 217
- Agent-based model, 158, 169, 171–173, 175, 176
- ambiguity, 218
- analytical method, 380
- anchor effective region radius, 391
- anchor map, 391
- anchor support structure, 391
- anisotropic material, 73
- ANSYS, 83
- approximation model, 345
- assembly, 511
- assembly and assembly planning, 533, 538
- assembly process generation/integration, 289
- assembly sequence definition algorithm, 291
- assembly-free, 35
- assembly-oriented design, 290
- atomic force microscope, 4
- axis aligned bounding boxes, 51

- B-Rep, 331
- B-reps, 379
- B-spline, 329
- Bézier surface, 329
- Bézier curve, 12
- bimanual
 - manipulation, 222
- binary boolean operations, 378
- binary image, 378
- binary image dimension, 381
- binary set, 378
- biomechanical model, 279
- biomechanical models, 262, 264
- Boolean, 380
- boundary contour, 378
- bounding box, 382
- business model, 469
- business process, 469
- business process model and notation, 470

- cable harnesses, 535
- CAD, 2, 560
- CAD (computer aided design), 534, 535, 538, 539, 545
- CADCAM, 539
- CAE, 2
- CAM, 2
- CAPP, 2
- carbon nanotube, 4
- Cauchy stress tensor, 83
- chemical master equation, 20
- chemical vapor deposition, 4
- CHRONO, 47
- CHRONO architecture, 49
- Cloud-based Applications, 435
- collaborative, 232
- Community evolution, 159, 160
- companies, 532, 533, 535, 536, 543, 547, 548
 - traditional knowledge capture methods, 532, 533, 535, 545, 549
- composite materials, 75
- computational efficiency, 125, 137–139, 141
- computer aided design, 290
- Computer-aided design, 2
- computer-aided engineering, 2
- computer-aided nanodesign, 2
- computer-aided nanomanufacturing, 2
- computer-aided process planning, 2
- conjugate directions, 12
- conjugate gradient, 13
- connection graph, 392
- conservative growing-swallow method, 380
- constitutive characterization, 73
- constrained contour simplification, 400

constrained Laplacian, 400
 constrained smoothing, 400
 constraint line, 337
 construction tree, 321, 323, 331, 339
 constructive solid geometry, 332
 contact forces, 511
 continuous-time Markov chain, 20
 contour length, 389
 controlled kinetic Monte Carlo, 3, 16
 convergence, 138, 139, 143, 146
 COTS, 221
 creativity, 215
 Crowdsourcing, 155
 CVT, 392
 cyber-physical systems, 188

DCLVDT, 76
 deformation computation, 518
 deformation simulation, 508
 degenerated triangles, 377
 Degree distribution, 159–162, 164
 degree elevation, 14
 degree reduction, 14
 density functional theory, 3, 7
 design, 532, 535, 545
 design reviews, 545
 design optimization, 73
 design optimization, 83
 Design Rational, 418
 Design Rationale, 434
 Design Repositories, 418
 dexterity, 216
 DFA design for assembly, 539
 DHM, 274
 DIC, *see also* digital image correlation (DIC)
 digital human model, 261
 digital image correlation (DIC), 101, 102, 122
 digital imaging, 97–101, 105, 122
 grid, 113
 metrology, 99
 digital mock-ups, 508
 dilation, 384
 direct slicing, 378
 direct strain imaging, 98, 105, 106, 109, 113,
 114, 116–122
 disassembly, 511
 discrete slicing data, 384
 discretized, 381
 dismounted soldier training system, 563
 dissipated energy density, 81
 distance map, 380, 388

distortional or isochoric energy density, 82
 driving line, 337
 DSI, *see also* direct strain imaging

e-manufacturing, 423
 eigenvalues, 518
 elasticity, 508
 element connectivity, 127, 145
 element distortion, 125, 138, 140
 empathic, 234
 empirical, 5
 engineering design, 336
 Engineering Design Knowledge, 413
 Classification, 414, 416
 Flow within Manufacturing, 417
 Life Cycle, 415
 Management, 414, 419
 Reuse, 411
 Visualization, 433
 ergonomic centered design, 266
 Ergonomics, 512
 ergonomics, 262, 263
 erosion, 385
 error-bounded, 384
 mesh coarsening, 144
 experiments, 599
 expert user feedback, 536, 543, 544, 547, 548
 externalization, 235

FDM, 377
 feature, 325, 331
 feature-based approach, 335
 feature-based modeling, 334
 field-consistent, 133, 136, 139, 140
 finite element method, 524
 finite strain formulation, 80
 first principles, 3
 FlatWorld, 560
 flexible body dynamics, 47
 flow, 219
 fluid-structure interaction, 47
 focused ion beam, 4
 force feedback, 509
 free-form feature, 337
 free-form feature identification, 198
 free-form shape, 322
 free-form surface, 329
 full field, 98, 100, 102, 109–113, 118–120,
 122
 displacement, 98, 100, 112
 measurement, 97, 98

- meshless, 108, 122
- strain, 98, 100, 101, 105, 106, 111, 112
- full-field, 74
- fully free-form feature, 337
- functional requirements, 323
- fuzzy front end, 215

- Game theory, 158, 169, 171, 172, 177
- game-engine, 561
- gaps, 377
- gesture, 193
- gesture-based interaction, 332
- global optimization, 358
- global optimum, 358
- GPGPU, 369
- GPU, 38, 47, 404
- granular form, 47
- granular material, 47
- graph theory, 365
- graph-based robust optimization, 365

- hand motions, 193
- handheld devices, 201
- handling of dynamic complexity, 199
- haptic feedback, 252
- haptic interaction, 508
- haptic interfaces, 240
- haptic modes of interaction, 193
- haptics, 543
- HCI
 - human computer interaction, 219
- HDT
 - hybrid design tools, 215
- heuristic
 - shape ideation, 216
- hexapod, 75
- holistic, 216
- HoloVisio 128WD display, 191
- Hooke's tensor, 81
- HRED, 562
- human factors, 266, 539
- human models for ergonomics, 262
- hybrid, 215
- hydraulic cylinder, 75
- Hypermedia, 420
- Hypermedia1 Multicosm, 422
- hyperspherical, 77

- ideation, 215
- idiosyncrasy, 218
- imagination, 215

- immersive environment, 558
- immersive simulators, 560
- immersive viewer, 559
- implicit indicator function, 378
- implicit solid, 377
- implicit surface, 330
- incubation, 220
- integer arithmetic, 378
- integrated concept advancement, 187
- interactive assembly, 511
- interactive augmented prototyping, 198
- interactive deformation simulation, 508
- interactive design validation, 507
- interactive manipulation and simulation, 195
- interactive virtual prototyping, 240, 243
- interface, 218
- intermediate region, 384
- interoperability, 322
- intuition, 215
- inverse characterization, 74
- inverse problem, 83
- iteration, 216

- Kinect, 275, 278
- kinetic Monte Carlo, 3, 8
 - controlled kinetic Monte Carlo, 3, 16
- knowing in action, 217
- Knowledge
 - capture, 531, 532
 - capture systems, 534
 - formalization, 532, 533, 536
 - formats, 532, 535, 543
- knowledge
 - acquisition, 531, 532
 - automated capture, 533, 543, 550
 - user validation, 533, 537, 538, 543, 544, 547
- knowledge formats
 - annotated video clip, 536
 - assembly plans, 538
 - Dred, 536, 544
 - English syntax, 536, 544
 - IDEF, 536, 544
 - PSL, 536, 544
 - storyboards, 536
 - XML, 536, 544
- knowledge push, 538
- knowledge work flow, 532, 537

- large deformation, 125, 126, 141, 146
- Layered manufacturing, 377

- learning by doing, 217
- length scale effects, 79
- level-editor, 561
- level-set, 31
- lfds
 - loosely fitted design synthesizer, 226
- limiting line, 337
- line segment, 381
- Linked Data, 435
- local polynomials, 130, 132, 133, 139, 140
- lookup table, 382

- M4 carbine, 566
- Manufacturing capability, 444
- manufacturing process management, 291
- Marching based method, 380
- marching square method, 382
- marketing requirements, 241
- mathematical representation, 384
- Matlab, 83
- matrix-free, 36
- mechatronic testing, 74
- mesh coarsening, 143–145
- mesh density, 142, 146
- mesh intensity, 142, 143
- mesh modification, 125, 141–143
- Mesh refinement, 144
- mesh refinement, 143, 144
- mesh smoothing, 143, 145, 146
- meshless, 97, 98, 102, 103, 105, 108, 110, 113, 119, 122
 - approximation, 97, 98, 102, 109, 111, 112
 - random grid (MRG) method, 98, 102, 109, 110, 112–114, 116–120, 122
- meta-cognition
 - distributed, 215
- metamodel, 345
- metrology, 98–100, 102, 122
- microstructural tensors, 83
- minimum energy path, 10
- Minkowski Sum, 380
- Mirroring hypothesis, 166, 167, 177
- mixed reality, 216
- mixed-discrete optimization, 363
- mixed-integer optimization, 363
- MLS surface, 380
- Mocap, 264, 274
- modal analysis, 514
- model parameterization, 321
- modification process, 321

- Modularity, 157, 163, 164, 168, 175
- molecular dynamics, 3, 7
- morphological operations, 380
- moving least square, 126, 130, 136, 137, 139, 140
- MRG, *see also* meshless
- MRGM, 76
- MST, 392
- multi degree of freedom, 74
- multi-disciplinary, 215
- multi-modal, 226
- multiaxial loading, 74
- multiaxial robotic testing, 73
- multiaxial state of strain, 74
- multimodal interaction, 245
- Multiple Scenario Editing, 574
- multiple viewpoints oriented assembly, 291
- multiscale simulation, 3
- multisensory virtual reality environment, 245
- multivariate Lagrange method, 130

- nanomanufacturing, 1, 8
 - computer-aided nanomanufacturing, 2
- nanotechnology, 1
- nearest nodes, 127, 129, 132, 133, 136, 138, 141
- Networks, 157–161, 164, 168
 - Bipartite, 160–162, 166, 168
 - Clustering, 168
 - Scale-free, 161, 164
- neuroscience, 550
- NN-FEM, 126–130, 132, 138–142, 146, 148, 149
- Non-manifold features, 377
- non-uniform rational b-splines, 346
- NRL, 74
- NRL66.3, 75
- nudged elastic band, 10
- numerical method, 380
- NURBS, 329
- NURBs, 346

- Object Manipulation, 570
- Offsetting, 380
- ontology, 449
- Open-source, 155, 156, 159, 171, 174, 178
- opening, 385
- optima, 358
- optimization, 29, 358
 - particle swarm optimization, 10
- outward offset region, 387

- overhang, 380
- parallel computing, 47
- parameterization, 324
- parametric modeling, 331
- PareTO, 35
- part region, 381
- particle swarm optimization, 10
- path planning, 4
- pcp
 - product creation process, 215
- PGM, *see also* pure grid method (PGM)
- physical vapor deposition, 4
- Piola-Kirchoff stress tensor, 83
- pixel width, 381
- PLM product lifecycle management, 536
- point cloud, 377
- polygon-based region subtraction, 378
- potential energy surface, 3
- potential region, 384
- preliminary design, 320
- product data management, 291
- proactive assembly oriented design, 290
- probabilistic computational tree logic, 471
- probabilistic surrogate model, 354
- process flow, 470
- process planning, 2, 20, 377
 - computer-aided process planning, 2
- product design engineering based on generative assembly sequences, 291
- product design process, 319
- product development, 318
- product engineering, 532
- Product evolution, 158, 159, 163–167, 169, 173, 175, 177
- product life cycle, 531
- product life cycle management, 290
- product relationships description based on mereotopological theory, 291
- product requirements, 322
- product specifications, 241
- product-process model, 293
- proportional path, 77
- pure grid method (PGM), 100–102, 122

- quadrature point, 126–128, 132, 133, 135, 137–140
- quantum Monte Carlo, 3, 6
- questionnaire, 543, 547

- r-homeomorphic, 381
- r-regular solid, 378
- raw
 - shaping, 215
- real time haptic interactions, 515
- real-time, 216
- reduction method, 514
- reflection on action, 217
- region cleaning, 389
- region subtraction, 384
- reliable general support region, 378
- reliable region, 381
- REMDIS-2D, 83
- REMDIS-3D, 83
- rendering pipeline, 48
- representation, 215
- reverse engineering, 328
- rigid multi-body dynamics, 47
- robust optimization, 365

- saddle point, 13, 15
- sampling rate, 381
- sampling resolution, 379
- scanning probe lithography, 17
- Scenario Creation, 568
- scene-graph, 573
- self-intersection, 377
- self-intersection free, 378
- Self-organization, 155, 157, 158, 177
- self-support area, 378
- self-support feature threshold, 387
- Semantic Web, 428
- semantic-based modeling, 340
- semi free-form feature, 337
- sensorial
 - space, 221
- shadow region, 380
- shape approximation error, 378, 400
- shape functions, 98, 102, 104, 106, 122, 125–127, 129–141, 149
 - meshless, 113
- shape generation, 326
- shape modification, 323
- shape optimization process, 320
- shape transformation, 325
- shrinkage, 401
- SIMD, 48
- SIMP, 31
- simulation, 2
 - multiscale simulation, 3
- simulation process, 321
- singular point, 377

- skeleton-based assembly context definition, 291
- sketches, 322
- SLA, 379
- slab, 380
- slicing, 378
- slicing data, 381
- slicing orientation, 382
- slicing plan, 381
- sliding-on-stick, 401
- small strain formulation, 80
- Social network analysis, 159, 160, 162
- Social Networking Sites, 426–427
- Socio-technical system, 158, 165, 166, 169, 176, 177
- software pipeline, 561
- soldering, 543
- spatial interactive visualization, 184
- SPPARKS, 19
- stick, 382
- stiffness matrix, 127–129
- STL, 377
- strain energy, 128
- strain energy density, 80, 128, 129, 141–143, 145
- strain state cloud, 77
- structure element, 388
- Subdivision method, 380
- subdivision surface, 330
- subpixel, 98, 99
- support generation, 378
- support region, 381
- surrogate model, 345
- SUS questionnaire, 548
- synthesis, 216
- system
 - system 1
 - system 2, 219
- Systema P.T.W.-4, 566
- T-spline, 331
- tacit knowledge, 215
- tangential contact, 384
- tangible, 216
- target line, 337
- technical specifications, 241
- tessellated model, 330
- thinking on your feet, 217
- time and motion study, 532
 - chronocyclegraphs, 541
 - Gilbreth, 541
 - real world operation time estimation and mapping in virtual worlds, 538, 539
 - therbligs, 541
- timeline, 536, 537
- top-down, 386
- topological complexity, 389
- topological sensitivity, 33
- topologically faithful, 378
- topology, 29
- topology preserving contouring, 383
- transition state theory, 9
- transition states, 3, 12
- UDM, 380
- UML, 470
- user
 - in the loop, 222
- user interaction model, 245
- user logging, 533, 543, 545, 547, 549
 - synchronous logging framework - UbiITS, 546
- VADER (Virtual Aided Design Engineering Review System), 545, 546
- virtual aided design, 535
- virtual assembly, 532
- virtual assembly and assembly planning, 533
 - automation, 533, 539
 - haptics, 539
- Virtual communities, 155
- virtual engineering, 532, 543
- virtual environment, 558
- virtual global concurrent engineering, 533
- virtual objects, 186
- Virtual prototyping, 511
- virtual prototyping, 2
- Virtual Reality, 507
- virtual reality, 216, 531, 532, 535, 557
 - immersive desktop, 546
 - immersive powerwall, 546
- virtual soldering, 543
- virtual testing, 279
- volumetric images, 377
- volumetric or dilatational energy density, 82
- Wiki, 425
 - Semantic Wiki, 429
- work-flow pipeline, 567
- workbench, 221
- workflow, 469
- World Wide Web, 412

Web 1.0, 423

Web 2.0, 424

Web 3.0, *see* Semantic Web

WWW, *see* World Wide Web