CAMBRIDGE

Cambridge University Press
978-1-108-47907-3 — Rigid Body Kinematics
Joaquim A. Batlle , Ana Barjau Condomines
Index
More Information

Index

acceleration
  absolute, 66
  angular, 12
  complementary, 66
  of a contact point, 140
  Coriolis, 66
  distribution in a rigid body, 115
  intrinsic components, 60
  linear, 57
  normal, 60
  relative, 66
  tangential, 60
  transportation, 66
  vector, 57
angle
  Euler, 11, 15
  nutation, 21
  pitch, 21
  precession, 21
  roll, 21
  spin, 21
  yaw, 21
assembling difficulty, 246–247
axis
  Euler axes, 15
  instantaneous screw axis, 124, 128
  rotation about the screw axis, 129
  sliding along the screw axis, 129
  three-body axis system, 21
  two-body axis system, 21
axode
  fixed, 129
  moving, 129

center
  rotation instantaneous center, 134
  rotation instantaneous center of a chassis, 143, 150, 152–153, 156
centrode
  fixed, 135
  moving, 135
composition
  of accelerations, 66
  of movements, 63, 70
  of rotations, 15, 27, 32
  of velocities, 63, 66
configuration
  constraint equations, 226
  manifold, 226
  of a multibody system, 225
  of a rigid body, 115
  space, 225
constraint
  basic constraint conditions, 114
  configuration, 224
  configuration constraint equations, 226
  contact, 122
  equations, 114, 122
  fully redundant, 243
  geometric, 225
  geometric constraint equations, 226
  kinematic, 224, 231
  kinematic constraint equations, ***232***
  partial, 253
  redundant, 243
  reonomic, 228
  scleronomic, 228
  superposition, 240, 253
contact, 122
  geometric contact point, 120
  no sliding, 122
  sliding, 122
coordinate
  generalized, 224–225
  independent, 224–225
  pseudocoordinates, 230
  system, 2, 225
curvature
  center, 60
  radius, 60
  torsional radius, 77

degree of freedom, 142, 224, 231

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-47907-3 — Rigid Body Kinematics
Joaquim A. Batlle , Ana Barjau Condomines
Index
More Information

Euler
  angles, 11, 15
  axes, 15
  families of Euler angles, 20
  parameters, 32

frame of reference
  absolute reference frame, 63
  body reference frame, 114
  mathematical reference frame, 2
  relative reference frame, 63
Frenet
  vector basis, 59, 77

geometric contact point, 140

holonomy, 234

inertial guidance, 79

kinematic torsor, 115, 127, 253
kinematics
  multibody systems kinematics, 224
  point kinematics, 54
  rigid body kinematics, 114–115

maneuverability, 142, 148–149, 156, 158
motion
  planar, 134
  translation, 116

orientation parameters, 32
  Cayley–Klein, 34
  Euler, 32
  Rodrigues, 34
osculating circle, 60
osculating plane, 60
overconstrained system, 243

perfect rolling, 121–122, 124, 140
position vector, 55
pseudocoordinates, 230

redundancy, 224, 247, 253
  degree of tangent redundancy, 243, 253
  detection, 244
  full, 240, 243, 253
  systematic analysis, 253
  tangent, 240, 243, 248, 253
rigid body, 114
  acceleration distribution, 115
  velocity distribution, 115, 124
rotation
  around fixed axis, 27
  Euler angles, 11, 15
  general, 15
  instantaneous center, 134–135
  parameters, 32
    Cayley–Klein, 34
    Euler, 32
    Rodrigues, 34
  simple, 13, 15

space
  configuration, 224–225
  phase, 224, 230–231
  physical space, 2
speed, 60
  associated with pseudocoordinates, 230
  generalized, 224, 230
steering
  directionally stable, 145
  directionally unstable, 145
  four-wheel steering, 149
  front steering, 145
  oversteer, 142
  rear steering, 145
  steering wheel bar, 156
  trapeze, 144
  understeer, 142
  wheel, 143
system
  autonomous, 233
  holonomic, 224, 234
  mechanical, 225
  multibody, 225
  multibody system, 224
  nonholonomic, 224, 234
  overconstrained system, 243

time, 2
  absolute, 2
  derivative, 5, 7
  geometric, 7, 9
  integration through vector bases, 36
  principle of absolute simultaneity, 2–3
  time derivative, 7
    analytical, 9
    in different reference frames, 12
trajectory, 3, 55
translation
  longitudinal, 165, 167
  transverse, 165, 168
translation motion, 116
  circular, 116
  curvilinear, 116

vector
  components, 6
  graphical representation, 5
  operations, 5

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-47907-3 — Rigid Body Kinematics
Joaquim A. Batlle , Ana Barjau Condomines
Index
More Information

vector basis, 6
  fixed, 5, 9
  Frenet, 59, 77
  intrinsic, 59, 61, 77
  moving, 5, 10
vehicle
  with conventional wheels, 142
  with omnidirectional wheels, 158
velocity
  absolute, 63
  angular, 11
  distribution in a rigid body, 115, 124
  intrinsic components, 60
  linear, 57
  relative, 63
  transportation, 63
  vector, 57

wheel
  conventional, 142
  nonsteered, 142
  omnidirectional, 158
  omnidirectional wheel with rollers, 158, 162
  omnidirectional wheel with spherical rollers, 163

© in this web service Cambridge University Press www.cambridge.org