

0 (186) **-100** (7) **-10** (17) **-11** (9) **-1** (34) **-2000** (3) **-20** (11) **-29** (4) **-2** (9) **-2lmed** (2) **-3000** (2) **-30** (6)
-3 (18) **-4000** (2) **-40** (5) **-4** (3) **-50** (7) **-5** (9) **-6** (2) **-comx** (4) **-comy** (4) **-comz** (3) **-COS** (12) **-cosa** (5) **-l2** (4)
-l (16) **-p** (4) **-pfacility** (11) **-r** (6) **-sin** (18) **-sina** (5) **-u** (5) **000064m2** (3) **00113905rad** (6) **0m** (9)
0rad (7) **1-** (6) **1-cos2** (3) **1000km** (2) **1000m** (9) **1000nm** (6) **100kg** (8) **100km** (2) **100m** (6) **100ns** (2)
10a (3) **10b** (2) **10kg** (12) **10km** (2) **11m1** (4) **11m2** (3) **11mfacility** (2) **1570kg** (5) **15kg** (3) **16e** (3) **16kg** (3) **1j** (5)
1kg (3) **1m** (4) **1rad** (5) **1rotational** (3) **2004a** (4) **208129s** (2) **22m1** (4) **250m** (3) **25kg** (4) **25m** (2) **2a** (5) **2b** (3) **2d** (9)
2divisions (2) **2j** (5) **2lr** (6) **2p** (19) **377m** (3) **3a** (4) **3b** (4) **3d** (14) **3sub-spans** (3) **425mtether** (3) **4r2** (4)
500kg (6) **5bc49jb1115** (3) **5kg** (4) **5mtether** (7) **64mm2** (2) **7m1** (2) **7the** (2) **82kg** (3) **8kg** (3) **9b** (3) **9gp** (4) **ab** (3)
ability (2) **able** (3) **absolute** (4) **acceleration** (16) **acceptable** (9) **account** (5) **accuracy** (4)
accuracygoal (2) **accurately** (4) **achieve** (6) **acknowledgements** (3) **act** (4) **action** (3) **active** (3) **actual** (3) **added** (5)
additional (14) **additionally** (4) **adjusted** (2) **advantage** (8) **adverse** (2) **affect** (4) **aim** (4) **al** (37)
algorithms (3) **aligned** (7) **allows** (12) **almost** (3) **along** (23) **alternative** (7) **altitude** (7)
analysed (14) **analysis** (19) **analytical** (5) **andcartmell** (3) **angle** (51)
angular (37) **angularvelocity** (3) **antenna** (3) **apart** (2) **apogee** (33) **appears** (4)
appendix (10) **applied** (7) **approach** (4) **approximately** (20) **arbitrary** (5) **area** (8)
arms (17) **around** (27) **article** (4) **assemble** (11) **asshown** (3) **assumed** (15)
assumption (9) **asthe** (2) **asymmetrical** (13) **asymmetry** (11) **atmosphere** (4) **attained** (2)
author (2) **automatic** (5) **available** (4) **average** (3) **avoid** (5) **axes** (18) **axis** (12) **backward** (4)
ballistic (4) **based** (12) **baseline** (4) **becomes** (4) **behaviour** (29) **best** (2) **better** (4)
biesbroek (2) **body** (15) **book** (3) **boosting** (3) **boundary** (2) **braking** (20) **breaking** (3) **broadly** (3) **build** (3)
burn (5) **calculated** (30) **called** (3) **capable** (3) **capture** (14) **carried** (3) **carroll** (3)
cartmell (16) **case** (150) **caused** (6) **cells** (5) **central** (8) **centre** (50) **centreof** (4)
certain (3) **change** (49) **chapter** (19) **characteristic** (9) **choice** (5) **choosing** (4)
chosen (21) **circular** (10) **clarke** (3) **clean** (2) **clear** (4) **clearly** (10) **cluster** (2) **code** (4) **collected** (3)
com (136) **combined** (4) **common** (5) **compact** (2) **compared** (19) **comparison** (3) **complexity** (3)
complotsof (3) **component** (9) **computational** (4) **comx** (7) **comy** (7) **comz** (7) **concentrated** (3)
concept (13) **conceptual** (4) **concern** (6) **conclusions** (5) **conditions** (39)
conducting (3) **confer** (2) **configurations** (10) **connected** (3) **conservative** (2) **consideration** (4)
considering (7) **constant** (9) **constructing** (41) **containing** (6) **continue** (4)
contours (5) **contribute** (4) **control** (16) **convenient** (2) **conventional** (2) **converted** (3)
coordinate (77) **coordinatesystem** (6) **corresponding** (8) **cos2** (5)
COS (177) **cosa** (4) **cosmo** (4) **cost** (7) **coupled** (4) **covered** (8) **crawl** (5) **crawler** (3) **create** (2)
criteria (3) **critical** (6) **cross-sectional** (3) **csa** (4) **current** (6) **cut** (3) **cycle** (10) **damp** (6) **data** (9)

daughter (3) david (3) **debris** (10) decelerating (3) decreasing (2) default (3) **defined** (24) definite (3) deform (3)
deg (6) degradation (2) **degree** (9) deltav (9) demonstration (6) density (7) dependant (6)
deployed (26) **deployment** (50) derived (15) **describe** (28)
design (9) desired (3) determined (3) device (4) **diagram** (13) difference (17) difficult (6)
direction (8) directly (4) disc (3) discretised (3) **discretized** (24) discussed (7)
displacement (4) **distance** (10) distributed (6) dividing (5) divisions (9) divs (6) dotted (7)
dr (2) driving (5) dt (5) dual-payload (2) **due** (20) dumbbell (14) **dynamics** (42) early (5)
earth-moon (3) **earth** (34) ease (9) easier (5) eb (16) eccent (3) **eclipse** (14) ed (4) edges (3)
effect (18) efficient (5) either (4) elastic (4) electric (2) electrodynamic (4) **element** (6)
elevator (7) **elliptical** (11) employed (6) enable (6) encountered (3) encouraging (3)
energy (72) engineering (8) enhance (4) ensure (9) entire (4) environment (6) ep (3)
equal (19) equation4 (2) **equations** (164) equilateral (3) equivalent (6) **errors** (15)
esa (5) escape (3) essentially (5) estimate (2) **et** (28) **evaluated** (12) exactly (7) **examined** (8)
example (15) excellent (3) **exchange** (17) excited (3) exerted (3) exhibit (3) exist (3) **expanded** (7)
expected (3) explained (3) exponential (5) **expression** (17) extend (3) external (2) extreme (2)
facility (62) **factor** (11) failure (4) feasible (2) fiber (7) fibre (4) **field** (7) figure3 (3) figure4 (3)
figure (148) final (7) finding (3) firstphase (3) fixed (3) flexibility (3) focussed (2) **following** (20)
force (28) **form** (12) forthefivecases (3) forward (6) **found** (17) fraction (6) frame (4) free (2)
freedom (4) friends (3) fuel (3) fulfil (3) full (9) fully (6) **function** (12) fundamental (10) furthermore (3)
gain (3) ge (5) **general** (22) **generalised** (29) geo (3) **given** (32) **gives** (28)
glasgow (6) global (4) goal (4) gradient (2) graph (3) graphics (4) gravitational (4) **gravity** (6) greater (3)
half (3) hanging (3) height (4) held (5) hgpal (3) **higher** (9) highly (4) hohmann (8) horizontal (2) houses (2)
hoyt (5) hpa (5) hyperbolic (3) **i1** (9) **i2** (10) **i3** (19) **i4** (9) **i5** (10) idea (7) ideal (3) ideaof (3) **identical** (14)
identifies (3) illustrative (4) impact (3) impart (6) **important** (13) in-depth (5) **in-plane** (21)
inclination (65) included (12) **increase** (27) increment (7)
independent (4) indicated (4) industrial (3) inequation6 (2) inertia (3) **inertial** (56) inertialplane (3)
infigure5 (4) infigure6 (3) **influence** (14) influenceof (2) information (5) **initial** (71) initialmmetspin-
up (3) insection3 (3) **instability** (5) instantaneous (2) **instead** (6) **intact** (12) **integrated** (16) intended (2)
interaction (7) **interesting** (8) internal (5) interplanetary (3) interpret (4) inthe (4) **introduced** (9)
introduction (5) **investigated** (10) involving (5) **iota** (6) **ipayload** (8) isnot (3) isshown (2) isused (3)
itether (8) jpl (3) kaya (3) kayaet (2) **keep** (6) kept (3) **key** (4) **kg** (7) **kinetic** (20) koon (2) **l1-l2** (4)
l1 (56) **l2** (41) l2mtether (2) lack (3) **lagrange** (36) **lagrangian** (17) larger (4) later (3)
launch (26) launcher (5) laws (3) layout (10) ldamp (7) **lead** (11) **length** (50) lengthl1 (3)

leo (7) **level** (12) levin (2) **li** (7) librating (4) **life** (6) lighter (3) **likely** (9) **limits** (14) **line** (16)
linear (22) linearly (2) links (3) **list** (8) literature (5) lmed (3) **local** (65) localj (4) **location** (11)
longer (2) **loop** (5) **lorenzini** (7) **lower** (13) lpcom (5) **lrec** (6) **lunar** (21) **m1** (22) **m2** (34)
m3 (7) **magnitude** (13) **main** (6) majority (3) manageable (2) manner (3) manoeuvre (2) manufactured (2)
marginally (4) **mars** (5) **mass** (266) massesof (2) **massive** (4) **massless** (5) massmodelling (2)
massof (3) masspoints (5) **match** (6) **material** (10) **mathematica** (16)
mathematical (14) **matrices** (10) **matrix** (11) **max** (10) **maximum** (32)
mcinnes (3) **mckenzie** (6) **means** (5) **mechanics** (7) **membrane** (5) mention (3) meo (3) merely (2)
method (23) **mfacility** (29) **mi** (10) **micro-satellite** (4) **midpoint** (4) **minimal** (3)
minimised (6) **minimum** (3) **misra** (2) **mission** (23) **miyi** (2) **mj** (11) **mmet** (74)
model (79) **modi** (5) **modules** (4) **modulus** (2) **momentum** (25) **month** (3) **moon** (15)
moravec (3) **motion** (69) **motionfor** (2) **motor** (38) **movement** (31)
moving (17) **mpayload** (17) **mrobot** (21) **msat** (12) **mtether** (55)
mtotal (7) **multi-tethered** (2) **multiple** (11) **multiplied** (3) **mw** (16) **mweb** (11) **nakano** (2) **name** (3)
ndsolve (8) **necessary** (6) **needed** (8) **negative** (10) **net** (7) **nm** (3) **nmtether** (6) **non-**
conservative (15) **non-conservativeforces** (3) **non-rotating** (5) **nonlinear** (4) **notable** (3) **note** (8)
number (11) **numerical** (19) **obtained** (5) **occurs** (3) **offset** (4) **ofthe** (3) **on-orbit** (3) **open** (3)
operation (6) **opposite** (7) **optimal** (2) **orbit** (126) **order** (15) **origin** (19)
oscillations (6) **others** (2) **otherwise** (3) **out-of-plane** (29) **outlined** (23) **output** (3)
outside (4) **overall** (4) **overview** (3) **p0** (22) **p175** (3) **p1** (20) **p2** (2) **p3** (2) **p43-45** (2) **package** (3) **paper** (4)
parameters (25) **parametric** (3) **particular** (3) **pascal** (4) **patch** (4) **path** (14)
payload (83) **pendulum** (5) **per** (4) **perfectly** (3) **performed** (9) **perhaps** (5) **perigee** (3)
period (5) **perturbations** (4) **pfacility** (6) **pfinal** (7) **ph** (3) **phase** (46) **phenomenon** (3) **physical** (3)
pi (5) **pilocal** (5) **pj** (22) **placed** (3) **planar** (5) **plane** (41) **platform** (6) **plots** (34) **pmass** (3)
point (78) **porig** (8) **position** (63) **possible** (16) **potential** (29)
power (14) **pozstion** (5) **ppayload** (9) **practical** (4) **precisiongoal** (2) **predicted** (3) **presence** (2)
previous (6) **previously** (7) **principles** (3) **problem** (6) **process** (5) **product** (5) **profile** (8)
properties (10) **proportional** (8) **proposed** (9) **propulsion** (5) **provide** (13) **psi** (8)
psidot (8) **ptether** (4) **published** (3) **purpose** (4) **qi** (3) **qj** (20) **r2** (36) **rad** (44) **radians** (2)
radius (28) **range** (4) **rate** (12) **ratio** (3) **re-use** (3) **real** (5) **rearth** (3) **reason** (3) **recommendations** (3)
reconfigure (7) **recovering** (8) **recovery** (40) **reduce** (8) **redundant** (4) **reel-in** (3)
reel (7) **reelin** (6) **reference** (6) **refining** (3) **reflect** (5) **relationship** (9) **relatively** (11)
release (35) **remain** (9) **remove** (3) **rendezvous** (4) **renewable** (2) **repeated** (6) **report** (4)

represented (8) **required** (18) **research** (12) resonance (3) **respect** (17)
results (16) retracting (3) **retrieval** (4) return (2) reusable (3) **review** (5) **rigid** (15) rigorously (2) **risk** (7)
robot (45) **roboty** (2) **robotz** (2) **rocket** (4) **rotation** (99) rotor (3) round (3) **rsun** (8) **runs** (7)
s2 (3) **safety** (5) **sample** (3) **satellite** (30) **scales** (4) **scenario** (5) **secondphase** (3) **seconds** (4)
section (30) **selected** (5) **sense** (2) **separated** (14) **sequatons** (4) **sequence** (22)
sequentially (3) **series** (11) **sets** (11) **several** (14) **shadow** (4) **sharing** (3) **short** (7)
shown (74) **shows** (22) **significant** (12) **significantly** (7) **similar** (13)
similarly (8) **simple** (9) **simplified** (9) **simply** (3) **simulation** (9) **simultaneously** (3) **sin** (121)
sina (10) **single** (9) **singularities** (4) **six** (3) **size** (8) **slightly** (4) **slow** (4) **slowly** (3) **slr** (3) **smaller** (4)
smooth (6) **solar** (16) **solid** (9) **solution** (23) **solved** (12) **solver** (4) **sorensen** (7)
source (7) **space-web** (48) **space** (47) **spacecraft** (12) **spans** (3) **specific** (4)
specify (6) **speed** (15) **spiderbots** (3) **spin-up** (24) **spin** (18) **split** (3) **square** (8) **ss** (6)
stabilise (13) **stability** (35) **stable** (9) **stage** (19) **standard** (4) **start-up** (3)
starting (15) **state** (3) **stationary** (3) **statistical** (9) **stator** (13) **steps** (9) **stiffness** (2) **strand** (3)
strength (11) **stress** (48) **stresss** (3) **stretch** (2) **structure** (27) **study** (17) **sub-**
spans (22) **successful** (3) **successfully** (5) **sufficient** (2) **suit** (3) **sum** (15) **summarise** (3) **sun-earth** (3) **SUN** (5)
supplied (4) **support** (3) **surface** (10) **sustain** (2) **swinging** (2) **symmetrical** (23)
system (252) **table** (28) **taken** (10) **taking** (9) **tapered** (3) **tasks** (3) **td** (6)
techniques (7) **technology** (4) **tend** (5) **tensile** (5) **tension** (38) **tensiont** (3) **terms** (46)
testable (3) **tested** (6) **tether** (449) **tethertension** (9) **thank** (9) **thecentroof** (2)
theequationsof (4) **thefacility** (4) **thegeneralised** (3) **themmet** (4) **thepayload** (8) **therefore** (26)
thesecond (2) **thesis** (15) **thesystem** (3) **thetether** (14) **thetethersystem** (2) **thetranslationalkineticenergy** (2)
thetwopayload (2) **theweb** (7) **thought** (5) **timeforthe fivecases** (6) **tlin** (6) **today** (2) **torque** (35)
total (11) **tothe** (4) **towards** (3) **tpayload** (2) **trajectory** (15) **transfer** (12) **transient** (3)
translation (11) **travel** (3) **treatment** (4) **triangle** (7) **trot** (13) **true** (5) **tsiolkovsky** (2) **ttrans** (11)
type (3) **unacceptable** (3) **undergoing** (3) **unique** (4) **university** (6) **unknown** (3) **unstable** (6) **unsym** (4)
used (52) **usually** (4) **validated** (8) **valuable** (2) **value** (10) **variables** (9) **variance** (2) **variation** (3)
various (3) **varying** (10) **vcom** (4) **vector** (51) **vehicle** (4) **velocity** (77) **verifiable** (3)
version (3) **vi** (3) **view** (3) **virtual** (7) **visualisation** (10) **vj** (4) **vorbit** (3) **vpayload** (10) **vrobot** (10)
VS (105) **vtether** (8) **walks** (3) **weather** (2) **web** (86) **website** (2) **whereas** (4) **williams** (3) **window** (2)
work (19) **workingprecision** (2) **wsb** (19) **www** (4) **x-axis** (11) **xx** (3) **xy** (4) **xyz** (5) **xz** (7) **xzy** (3) **y-** (2)
y-and (3) **y-axis** (16) **y-coord** (2) **y0** (2) **years** (5) **yes** (2) **yi** (2) **ylocal** (4) **ylocalxlocalpj** (2) **young** (3) **yx** (3) **yz** (33)
z-axis (20) **zcom** (4) **zero** (14) **ziegler** (10) **zx** (3) **Zy** (24) **zylon** (5) **zz** (6)

