bootstrapping

| bootstrapping/agents | *Agents and tasks* | |
|---|---|---|
| \agSp | $\mathsf{Agents}$ | |
| \agSpYU | $\mathsf{Agents}(\mathcal{Y};\mathcal{U})$ | All agents with given formats. |
| \agA | $\mathcal{A}$ | An agent |
| \agExp | $\mathsf{expl}$ | Agent's exploration phase |
| \agAct | $\mathsf{act}$ | Agent's action phase |
| \agAexp | $\mathsf{expl}_{\mathcal{A}}$ | Exploration phase for agent $\mathcal{A}$. |
| \agAact | $\mathsf{act}_{\mathcal{A}}$ | Action phase for agent $\mathcal{A}$. |
| \agAwtor | $\mathsf{WtoR}_{\mathcal{A}}$ | Map from the world to the result for the agent $\mathcal{A}$ |
| \agAwtob | $\mathsf{WtoB}_{\mathcal{A}}$ | |
| \agAintermediate | $\mathsf{intermediate}_{\mathcal{A}}$ | |
| \agSucAG | $\mathsf{success}^{\mathcal{G}}_{\mathcal{A}}$ | Success set for the agent $\mathcal{A}$ and goal $\mathcal{G}$. |
| \agRep | $\boldsymbol{m}$ | Agent representation |
| \agRepSp | $\mathcal{M}$ | Agent's model space |
| \agNuis | $\mathrm{G}_{\mathcal{A}}$ | |
| \agNuisComp | $\mathrm{G}^{\perp}_{\mathcal{A}}$ | Complement of $\mathrm{G}_{\mathcal{A}}$. |
| \agNuisObs | $\mathrm{G}^{\mathcal{Y}}_{\mathcal{A}}$ | |
| \agNuisCmd | $\mathrm{G}^{\mathcal{U}}_{\mathcal{A}}$ | |
| \agbbClass | $C_{\mathcal{A}}$ | |
| \agbbClCore | $C^0_{\mathcal{A}}$ | |
| \agGoal | $\mathcal{G}$ | The agent's goal (a subset of $\mathsf{StocProcesses}(\mathcal{Y}\times$ |

articles

| articles/bds | *BDS report* | |
|---|---|---|
| \BDSnk | $\mathsf{BDS}(n;k)$ | |
| \bgBDSfamily | $\mathsf{BDS}$ | Family of BDS sensors |
| \bds | BDS | Bilinear dynamics system |
| \BDS | BDS | |
| \omsum{...} | | omitted sum |
| \TT | $\mathbf{T}$ | Learned tensor |
| \TTe | $\mathsf{T}$ | ? |
| \TU | $\mathbf{U}$ | Learned tensor |
| \TUe | $\mathsf{U}$ | Learned tensor |
| \TM | $\mathbf{M}$ | Bilinear tensor in BDS dynamics |
| \TMe | $\mathsf{M}$ | Bilinear tensor in BDS dynamics |
| \TN | $\mathbf{N}$ | Bilinear tensor in BDS dynamics |
| \TNe | $\mathsf{N}$ | Bilinear tensor in BDS dynamics |
| \Tcov | $\mathbf{P}$ | Covariance of $\boldsymbol{y}$. |
| \Tcove | $\mathsf{P}$ | Covariance of $\boldsymbol{y}$. |
| \Tucov | $\mathbf{Q}$ | Covariance of $\boldsymbol{y}$. |
| \Tucove | $\mathsf{Q}$ | Covariance of $\boldsymbol{y}$. |
| \discInt | $T$ | Discretization interval |
| \nearavg | $\overline{\mu}$ | Average nearness |

| articles/bgds | *BGDS report* | |
|---|---|---|
| \bgds | BGDS | Bilinear gradient dynamics system |
| \BGDS | BGDS | |

| | | |
|---|---|---|
| \bgCmd | $\boldsymbol{u}$ | commands |
| \bgCmdH | $\boldsymbol{u}^{\mathbb{T}}$ | commands history |
| \bgCmdSp | $\mathcal{U}$ | commands space |
| \bgWorld | $\mathsf{W}$ | World |
| \bgWorldSp | $\mathcal{W}$ | World space |
| | | $\mathsf{W} \in \mathcal{D}(\mathbb{T}, \mathcal{U}, \mathcal{Y})$ |
| | | `$\bgWorld \in \bgRSSp(\bgTime, \bgCmdSp, \bgObsSp` |
| \bgAgent | $\mathsf{agent}$ | Agent |
| \bgAgentEx | $\mathsf{learn}$ | Agent exploration |
| \bgAgentAc | $\mathsf{act}$ | Agent action |
| \bgAgentRep | $\boldsymbol{r}$ | Agent representation |
| \bgAgentRepSp | $\mathcal{R}$ | Agent representation space |
| \bgAgentSp | $\mathsf{Agents}$ | Agent action |
| \bgCmdTr | $\boldsymbol{g}$ | Transformation of the commands |
| \bgCmdTrSp | $\mathrm{G}^{\mathcal{U}}$ | |
| \bgObsTr | $\boldsymbol{h}$ | Transformation of the observations |
| \bgObsTrSp | $\mathrm{G}^{\mathcal{Y}}$ | |
| \bgSamplingGroup | $\mathsf{Sampling}$ | Groups of sampling operations |
| \bgCalibration | $\mathsf{Calib}$ | Calibration operation |
| \bgBDSagent | $A_{\mathsf{BDS}}$ | The BDS agent |
| \bgBGDSagent | $A_{\mathsf{BGDS}}$ | The BGDS agent |
| \bgPopCode | $\mathsf{pop}$ | Popoulation code |
| \bgRankCode | $\mathsf{rankcode}$ | Rank code |
| \bgRangeFamily | $\mathsf{RF}$ | Family of range-finders models |
| \bgCmdConstraints | $\Omega_{\boldsymbol{u}}$ | |
| \bgPopK | $\psi$ | |

| articles/bgds/old | *BGDS report* | |
|---|---|---|
| \state | $\boldsymbol{x}$ | Generic underlying state. |
| \detecte | $d$ | Detector |
| \submean{...} | | Quantity with mean normalized. |
| \dist | $\sigma$ | Distance to obstacle |
| \distn | $\sigma^*$ | Distance to obstacle, mean normalized. |
| \rfnl | $\beta$ | Nonlinear function in range-finder tensors. |
| \near | $\mu$ | Nearness |
| \lum | $y$ | Luminance |
| \lumn | $y^*$ | Luminance, mean normalized |
| \sptran | $\boldsymbol{\ell}$ | Sensor pose (translation) |
| \sprot | $\ell_\theta$ | Sensor pose (rotation) |
| \slvel | $\boldsymbol{v}^{\boldsymbol{s}}$ | Sensor linear velocity (when off axis) |
| \savel | $\boldsymbol{\omega}^{\boldsymbol{s}}$ | Sensor angular velocity (when off axis) |
| \TX | $\mathbf{X}$ | Generic metric |
| \TXe | $\mathsf{X}$ | Generic metric |
| \OS | $\mathrm{S}$ | $S = s \times \nabla$ |
| \convf | $f_*$ | Indicates the convolution with a kernel $f$. |
| \my | $m$ | Metric on the tangent space of $y(s)$. |
| \ip{...} | | |
| \bgBGDSfamily | $\mathsf{BGDS}$ | Family of BGDS sensors |
| \BGDSsk | $\mathsf{BGDS}(\mathcal{S}; k)$ | |
| \focal | $F$ | Pinhole camera focal length. |
| \traindist | $p_{\mathrm{T}}$ | Training distribution. |

| | | |
|---|---|---|
| \trainsym | $\mathsf{Sym}(p_{\mathrm{T}})$ | Symmetry group of $p_{\mathrm{T}}$. |

| articles/bgds/logical | *Gradient dynamics* | |
|---|---|---|
| \obslsp | $\mathcal{Z}$ | Observation logical space |
| \obsl | $\boldsymbol{z}$ | Observations in logical space |
| \obsle | $z$ | Observation logical space element |
| \xtos | $\varphi$ | Mapping between $\mathcal{S}$ and $\mathcal{Z}$. |
| \jac | $\mathbf{J}$ | Jacobian of $\varphi$ |
| \jace | J | An element of the Jacobian of $\varphi$. |
| \mz | $\mu$ | Metric on the tangent space of $z(x)$. |
| \mmu | $M$ | Metric for the commands $u$. |

| articles/bgds/logical/grads | *Gradient dynamics* | |
|---|---|---|
| \Tzgd | $\mathbf{L}$ | $\boldsymbol{z}$ gradient dynamics |
| \Tzgde | L | $\boldsymbol{z}$ gradient dynamics (element) |
| \Tzgl | $\mathbf{M}$ | $\boldsymbol{z}$ gradient learned tensor |
| \Tzgle | M | $\boldsymbol{z}$ gradient learned tensor (element) |
| \Tzgcov | $\mathbf{S}$ | $\boldsymbol{z}$ gradient covariance |
| \Tzgcove | S | $\boldsymbol{z}$ gradient covariance (element) |
| \Tzad | $\mathbf{E}$ | Affine part of dynamics. |
| \Tzade | E | Affine part of dynamics (element) |
| \Tzal | $\mathbf{F}$ | Learned affine part of dynamics. |
| \Tzale | F | Learned affine part of dynamics (element) |

| articles/bgds/tensors | *BGDS report* | |
|---|---|---|
| \Tygd | $\mathbf{G}$ | $\boldsymbol{y}$ gradient dynamics |
| \Tygde | G | $\boldsymbol{y}$ gradient dynamics (element) |
| \Tygl | $\mathbf{H}$ | $\boldsymbol{y}$ gradient learned tensor |
| \Tygle | H | $\boldsymbol{y}$ gradient learned tensor (element) |
| \Tygcov | $\mathbf{R}$ | $\boldsymbol{y}$ gradient covariance |
| \Tygcove | R | $\boldsymbol{y}$ gradient covariance (element) |
| \Tyad | $\mathbf{B}$ | Affine part of dynamics. |
| \Tyade | B | Affine part of dynamics (element) |
| \Tyal | $\mathbf{C}$ | Learned affine part of dynamics. |
| \Tyale | C | Learned affine part of dynamics (element) |

| articles/bgds/models/deprecated | *Definition of random models* | |
|---|---|---|
| \bgTime | $\mathbb{T}$ | Time axis |
| \bgRS | $\boldsymbol{D}$ | Random model |
| \bgRSSp | $\mathcal{D}$ | All models |
| \bgRSinput | $\boldsymbol{a}$ | Input signal |
| \bgRSinputSp | $\mathcal{A}$ | |
| \bgRSinputH | $\boldsymbol{a}^{\mathbb{T}}$ | History of input signal |
| \bgRSoutput | $\boldsymbol{b}$ | |
| \bgRSoutputH | $\boldsymbol{b}^{\mathbb{T}}$ | History of output signal |
| \bgRSoutputSp | $\mathcal{B}$ | |
| \bgRSinputTr | $\boldsymbol{g}$ | |
| \bgRSinputTrSp | $\mathrm{G}^{\mathcal{A}}$ | |
| \bgRSoutputTr | $\boldsymbol{h}$ | |
| \bgRSoutputTrSp | $\mathrm{G}^{\mathcal{B}}$ | |
| \bgObs | $\boldsymbol{y}$ | observations |

| | | |
|---|---|---|
| \bgObsH | $\boldsymbol{y}^{\mathbb{T}}$ | observations history |
| \bgObsSp | $\mathcal{Y}$ | observation space |

| articles/camera | *Camera paper* | |
|---|---|---|
| \rank | order | |
| \place | place | |
| \ff | $f$ | Distance to similarity function |
| \Sany | $\mathcal{M}$ | Generic hypersphere |
| \targetSp | $\mathcal{M}$ | Target manifold |
| \Ssubset | $M$ | A subset of $\mathcal{M}$ XXX |
| \infr | infr | Informative radius |
| \ffr | infr$(f)$ | Informative radius of $f$ |
| \distradius | rad | Radius of a distribution |
| \distdiam | diam | Diameter of a distribution |
| \hausdorff | hausdorff | Hausdorff distance |
| \kimberley | kim | Kimberley value |
| \errproc | $e_{\text{pr}}$ | Procrustes score |
| \isoError | $e_{\text{iso}}$ | |
| \symError | $e_{\text{sym}}$ | |
| \relError | $e_{\text{r}}$ | |
| \scaledRelError | $e_{\text{sr}}$ | |
| \angcorr | $\rho_\theta$ | |
| \spearperf | $\rho_{\text{sp}}$ | Spearman performance measure |
| \spearperfn | $\rho^*_{\text{sp}}$ | Normalized Spearman performance measure |
| \dirset | $\mathcal{S}$ | Set of directions |
| \dirmat | $\mathbf{S}$ | Directions stacked in a matrix |
| \matX | $\mathbf{X}$ | |
| \matI | $\mathbf{I}$ | |
| \arot | $\mathbf{X}$ | |
| \cosmat | $\mathbf{C}$ | |
| \cosmatij | $\mathrm{C}_{ij}$ | |
| \distmat | $\mathbf{D}$ | |
| \distmatij | $\mathrm{D}_{ij}$ | |
| \simmat | $\mathbf{Y}$ | Similarity matrix |
| \simmatij | $\mathrm{Y}_{ij}$ | |
| \simmatii | $\mathrm{Y}_{ii}$ | |
| \simmatkl | $\mathrm{Y}_{kl}$ | |
| \algorparam | $\gamma$ | |
| \shannon | H | |
| \fov | FOV | field of view |
| \SKalgo | $SK$ | Shepard-Kruscall algorithm |
| \SBSEw | $SKv + w$ | An extension to the SK algorithm |
| \SBSE | $SKv$ | An extension to the SK algorithm (without warp |

| articles/dds | *DDS report* | |
|---|---|---|
| \ddsres | $\rho$ | Resolution of the sensor in a DDS. |
| \ddsarea | $\lvert\mathcal{S}\rvert$ | Area of the manifold $\mathcal{S}$. |
| \ddsbound | $d_{\max}$ | Bound on the maximum diffeomorphism in a DD |
| \DDS | DDS | |
| \dds | DDS | |
| \ddsl | DDSL | |

| | | |
|---|---|---|
| \DDSsu | $\mathsf{DDS}(\mathcal{S};\mathcal{U})$ | |
| \DDSLsvu | $\mathsf{DDSL}(\mathcal{S},\mathcal{V};\mathcal{U})$ | |
| \bgDDSfamily | $\mathsf{DDS}$ | |
| \bgDDSLfamily | $\mathsf{DDSL}$ | |
| \diffeoURL | *???* | Model |
| \cmdAlphabet | $\mathcal{U}$ | |
| \ncmdwords | $\lvert\mathcal{U}\rvert$ | Number of commands words. |
| \obsspD | $d^{\mathcal{S}}$ | Metric on $\mathcal{S}$. |
| \diffId | $\mathsf{Id}_{\mathcal{S}}$ | Identity diffeomorphisms. |
| \diffU | $\Gamma$ | Uncertainty of estimated diffeomorphism. |
| \diffDist | $d^{\mathsf{Diff}}$ | Distance between two diffeomorphism. |
| \cmdDist | $\mathcal{D}_{\mathrm{cmd}}$ | Distance between two commands. |
| \cmdADist | $\mathcal{A}_{\mathrm{cmd}}$ | Anti-distance between two commands. |
| \images | $\mathbb{F}(\mathcal{S})$ | |
| \ddsfov | $\mathcal{V}$ | Field of view for DDS |

articles/estgroups — *Estimation with symmetries*

articles/estgroups/state — *State*

| | | |
|---|---|---|
| \esSt | $\boldsymbol{x}$ | State |
| \esStDim | $n$ | Dimension of state space |
| \esStSp | $\mathcal{X}$ | State space |
| \esStDist | $\mu_{\boldsymbol{x}}^{\mathcal{X}}$ | Prior for state |

articles/estgroups/observations — *Observations*

| | | |
|---|---|---|
| \esObs | $\boldsymbol{y}$ | Observations |
| \esObsDim | $m$ | Observations dimensions |
| \esObsSp | $\mathcal{Y}$ | Observations space |
| \esObsMap | $h$ | Observation map |

$\boldsymbol{y} = \boldsymbol{n}h(\boldsymbol{x})$

```
$\esObs = \esNuis \esObsMap(\esSt)$
```

articles/estgroups/nuisances — *Nuisances*

| | | |
|---|---|---|
| \esNuis | $\boldsymbol{n}$ | Nuisance |
| \esNuisSp | $\mathrm{N}$ | Nuisance group |
| \esNuisDist | $\mu_{\boldsymbol{n}}^{\mathrm{N}}$ | Nuisance distribution |

articles/estgroups/estimators — *Estimators, risks and performances*

| | | |
|---|---|---|
| \esEst | $m$ | Estimator |
| \esEstSp | $\mathcal{M}$ | Estimator set |
| \esEstSpOpt | $\mathcal{M}^{\star}$ | Optimal subset of estimators |
| \esRisk | $e$ | Risk function |
| \esRiskSp | $\mathcal{E}$ | Risk space |
| \esRiskDist{...} | | Risk distribution for given estimator |
| \esRiskDistPO | $\preceq$ | Partial order defining preference on distributions |
| \esProb | $\mathcal{P}$ | Estimation problem |

articles/estgroups/symmetries — *Symmetries in the problem*

| | | |
|---|---|---|
| \esStAb | $\boldsymbol{\alpha}$ | Abstract state |
| \esStAbSp | $\mathcal{A}$ | Abstract space |
| \esRep | $\varphi$ | Representation |

| | | |
|---|---|---|
| | | $\varphi : \boldsymbol{x} \mapsto \boldsymbol{\alpha}$.<br>`$\esRep: \esSt \mapsto \esStAb$.` |
| `\esStSym` | A | Group of symmetries of the state |
| `\esObsSym` | B | Group of symmetries of the observation |
| `\esRiskSym` | C | Group of symmetries of the risk function |
| `\esPOSym` | D | Group of symmetries acting on the partial order |
| `\esProbSym` | $\mathcal{S}$ | Tuple of symmetries |

| `articles/groupspectral` | *Group spectral properties* | |
|---|---|---|
| `\gsHom` | HomMaps | Induced homomorphisms. |
| `\gsImage` | Image | |
| `\gsEqs` | EqSet | Fixed points of a function. |
| `\gsGA` | GrAct | If the function is the action of a group. |
| `\gsGAsym` | $\|\|$ | Used to specify that a function can be expressed |
| `\gsSym` | Sym | Set of symmetries |
| `\gsStrongCan` | SCan | Strong canonization operator |
| `\gsWeakCan` | WCan | Weak canonization operator |
| `\gsEquiCan` | BCan | Bold canonization operator |
| `\gsEndoCan` | MCan | Mild canonization operator |
| `\gsUnCan` | UCan | Unstructured canonization operator |
| `\gsNuis` | Sample | |
| `\regular` | regular | |
| `\unstr` | $\sim$ | Unstructured symbol. |
| `\jokFunc` | $\star$ | Joker function |
| `\zerFunc` | 0 | Zero function |

| `articles/groupspectral/defs` | *Group spectral properties* | |
|---|---|---|
| `\gsdContravariant` | $\xrightarrow{-1}$ | Contravariance |
| `\gsdInvariant` | $\xrightarrow{0}$ | Invariance |
| `\gsdEquivariant` | $\xrightarrow{\mathsf{Id}}$ | Equivariance |
| `\gsdIntroduces` | $\xrightarrow{\star}$ | Nuisance introduced |
| `\gsdUnstructured` | $\xrightarrow{\sim}$ | Unstructured result |

| `articles/invariances` | *Invariances* | |
|---|---|---|
| `\rndual{...}` | | Dual of a representation nuisance |

| `articles/soattotheory` | *Symbols used by Soatto* | |
|---|---|---|
| `\scene` | $\xi$ | scene |
| `\representation` | $\hat{\xi}$ | representation |
| `\minrep` | $\hat{\xi}^{\vee}$ | minimal representation |
| `\feature` | $\phi$ | feature |
| `\maxinv` | $\phi^{\wedge}$ | maximal invariant feature |
| `\suffstat` | $\phi^{\vee}$ | maximal invariant feature |
| `\image` | $\mathcal{I}$ | image |
| `\addnoise` | $n$ | additive noise |
| `\imageform` | $h$ | image formation function |
| `\groupnuis` | $g$ | nuisance which have the structure of a group |
| `\othernuis` | $\nu$ | other non-invertible nuisance |
| `\lightfield` | $\mathcal{L}$ | all possible images generated by a scene |
| `\complex` | $H$ | Complexity measure |

| | | |
|---|---|---|
| \actinfo | $\mathcal{H}$ | Actionable information |
| \covdet | $\psi$ | Covariant detector |

| articles/thesis | *Special symbols for thesis* | |
|---|---|---|
| \labelrefinement | ref | Indicates a refinement |
| \pchomeoR | $\mathsf{PieceHomeo}(\mathbb{R})$ | |
| \dianode{...} | | used in properties1.dot |
| \dianodem{...} | | |
| \bitZ | $\square$ | |
| \bitO | $\boxdot$ | |
| \infbinstrings | $\{\square, \boxdot\}^{\mathbb{N}}$ | Set of infinite binary strings |
| \chineseClose | (nosummary) | The Chinese character corresponding to "close" |
| \twosignals | $y^i, y^j$ | |
| \twosignalsa | $y^i$ | |
| \twosignalsb | $y^j$ | |
| \twosignalscolon | $y^i; y^j$ | |
| \semrelorder | $m$ | Order of a generic semantic relations |
| \infinit | $d$ | Infinitesimal |
| \genericsemrel | $\mathcal{R}$ | A generic semantic relation. |
| \gensemrelsym | $\mathsf{Sym}(\mathcal{R})$ | Symmetries of the semantic relation |
| \genericsimilarity | $R$ | A generic similarity measure. |
| \obsecdf | $c$ | CDF of one sensel |
| \cmdreverse | $\rho$ | The map from a command to its reverse. |
| \cmdopt | $\boldsymbol{u}^\star$ | The optimal command |
| \cmdnop | $\boldsymbol{u}^{\mathsf{nop}}$ | Command corresponding to "resting". |
| \rew | $R$ | Reward function |
| \placeneig | Neighbors | |
| \genericrel | $\sim$ | Generic relation |
| \notgenericrel | $\not\sim$ | |

| articles/thesis/longexample | *Long example* |
|---|---|
| \CalibA | CalibA |
| \CalibB | CalibB |
| \Smoothkernel | $k$ |
| \Smooth | $\mathsf{Smooth}_k$ |
| \BGDSAg | BGDSagent |
| \BGDSAgS | BGDSagentS |
| \DImagesU | $\mathcal{D}(\mathsf{Images}(\mathcal{S}); \mathcal{U})$ |
| \DImagesR | $\mathcal{D}(\mathsf{Images}(\mathcal{S}); \mathbb{R}^{n_{\boldsymbol{u}}})$ |
| \ABehavior | *behavior* |
| \DImagesSphU | $\mathcal{D}(\mathsf{Images}(\mathbb{S}^2); \mathcal{U})$ |
| \hobs | $\boldsymbol{x}$ |
| \hobse | $x$ |
| \bound | $M$ |

| common | *Common symbols to all papers* |
|---|---|

| common/abbreviations | *Other abbrevations* |
|---|---|
| \setA | $\mathcal{A}$ |
| \setB | $\mathcal{B}$ |
| \setC | $\mathcal{C}$ |

| | | |
|---|---|---|
| \setU | $\mathcal{U}$ | |
| \setM | $\mathcal{M}$ | |
| \setY | $\mathcal{Y}$ | |
| \setX | $\mathcal{X}$ | |
| \setZ | $\mathcal{Z}$ | |
| \setS | $\mathcal{S}$ | |
| \grG | G | |
| \grH | H | |
| \grK | K | |
| \grN | N | |

common/abbreviations/invariances/abbreviations

| | | |
|---|---|---|
| \sqa | $\boldsymbol{a}$ | |
| \sqae | $a$ | |
| \sqb | $\boldsymbol{b}$ | |
| \sqbe | $b$ | |
| \sqc | $\boldsymbol{c}$ | |
| \sqce | $c$ | |

common/acronyms *Acronyms*

common/algebra *Algebra*

| | | |
|---|---|---|
| \ones | $\mathbf{1}$ | |
| \idMat | $\mathbf{I}$ | Identity matrix |
| \matTrace | $\mathsf{Tr}$ | Trace of a matrix. |
| \angleFun | $\angle$ | Angle function |
| \flatten | vec | Matrix-to-vector rearrangement. |

common/basic *Basic stuff*

| | | |
|---|---|---|
| \setfun | $\rightrightarrows$ | Symbol for set functions (one-to-many) |
| \algfield | field | Field. |
| | | field$(\mathcal{X},+,\times)$ is an algebraic field.<br>`$\algfield(\aset{X},+,\times)$ is an algebraic fi` |
| \wellorder | wellorder | A well ordered set. |
| | | wellorder$(\mathcal{X},\leq)$ is a well-ordered set.<br>`$\wellorder(\aset{X},\leq)$ is a well-ordered set` |
| \orderedfield | orderedfield | A well ordered field. |
| | | orderedfield$(\mathcal{X},+,\times,\leq)$ is a well-ordered field.<br>`$\orderedfield(\aset{X},+,\times,\leq)$ is a well-ordered field.` |
| \powerset | powerset | Power set of a space |
| \supp | supp | Support of a set |
| \idFunc | Id | The identity function |
| \invFunc | $.^{-1}$ | Inverse function |
| \funcComp | $\circ$ | Function composition |
| \emptysequence | $\emptyset$ | Empty sequence |
| \allFuncs | Functions | All maps from a space to the other |
| \D | d | Used for integrals |
| \sign | sgn | Sign function |

| common/sequences | *Sequences* | |
|---|---|---|
| \sequences | Sequences | Set of sequences |
| \contsequences | ContSequences | Set of continuous sequences |
| \Aut | Aut | Automorphism group |
| \contFuncs | Continuous | Continuous functions on some metric space |
| | | Continuous($\mathcal{A}$) are all continuous functions on $\mathcal{A}$<br>`$\contFuncs(\setA)$ are all continuous functions on $\setA$.` |
| \differFuncs | Differentiable | Differentiable functions |
| \partitions | partitions | |
| \mExp | mexp | Matrix exponential |
| \bigO | $\mathcal{O}$ | Big-O notation |
| \smallo | $o$ | |
| \metricon{...} | | |
| \definedas | $\triangleq$ | |
| \crossprod | $\times$ | cross-product |
| \gsDom | Domain | |
| \gsCod | Codomain | |
| \interCC{...,...} | | |
| \interCO{...,...} | | |
| \interOC{...,...} | | |
| \interOO{...,...} | | |
| \unitInterval | $[0, 1]$ | |

| common/basic/logic | *Logic* | |
|---|---|---|
| \logicAnd | $\wedge$ | Logic "and" |
| \logicOr | $\vee$ | Logic "or" |
| \logicNot | $\neg$ | Logic "not" |

| common/simplesets | *Simple sets* | |
|---|---|---|
| \reals | $\mathbb{R}$ | Real numbers |
| \natnumbers | $\mathbb{N}$ | Natural numbers |
| \ratnumbers | $\mathbb{Q}$ | Rational numbers |
| \hreals | $*\mathbb{R}$ | Hyper-real numbers |
| \nonNegReals | $\mathbb{R}_{\bullet}^{+}$ | Non negative reals |
| \posReals | $\mathbb{R}_{\circ}^{+}$ | Strictly positive reals |
| \nzReals | $\mathbb{R}_{\circ}$ | Non zero reals |

| common/blackboxes | *Black boxes* | |
|---|---|---|
| \abb{...} | | A black box |
| \bbD | $\boldsymbol{D}$ | |
| \bbinv{...} | | Inverse of a black box |
| \bbli{...} | | left inverse of a black box |
| \bbri{...} | | right inverse of a black box |
| \alloutcomes | AllOutcomes | |
| \alloutputs | AllOutputs | All outputs of a given system |
| \bbDelay | $\Delta$ | The one-step delay system. |
| \vertblock | ❙ | |
| \bbAccum | ❙❙ | Accumulator system |
| \inLoop | Loop | Closes the loop around a system |
| \idSys | IdSys | The identity system |

| | | |
|---|---|---|
| \bbSp | $\mathcal{D}$ | Set of black boxes |
| | | $\mathcal{D}(\mathcal{X};\mathcal{Y})$ are all the black boxes from $\mathcal{X}$ to $\mathcal{Y}$.<br>`$\bbSp(\setX;\setY)$ are all the black boxes from $\setX$ to $\setY$.` |
| \bbFM | $\mathcal{D}_{\mathsf{fm}}$ | Systems with finite memory |
| \bbSpInv | $\mathcal{D}^\star$ | Set of invertible systems |
| \bbFMinv | $\mathcal{D}^\star_{\mathsf{fm}}$ | Systems with finite memory and invertible |
| \bbSpIns | $\mathcal{D}_{\text{inst}}$ | Set of instantaneous systems |
| \bbSpDet | $\mathcal{D}_{\text{det}}$ | Deterministic systems |
| \bbSpInvIns | $\mathcal{D}^\star_{\text{inst}}$ | Set of invertible and instantaneous systems. |
| | | $\mathcal{D}^\star(\mathcal{A})$ is a subset of $\mathcal{D}(\mathcal{A};\mathcal{A})$<br>`$\bbSpInv(\setA)$ is a subset of ${\bbSp(\setA;\setA)}$` |
| \bbSpCore | $\mathcal{D}^\circ$ | Systems up to representation |

common/blackboxes/abbreviations

| | | |
|---|---|---|
| \bbDinv | $\boldsymbol{D}^{-1}$ | |
| \bbDri | $\boldsymbol{D}^{R}$ | |
| \bbDli | $\boldsymbol{D}^{L}$ | |
| \bbE | $\boldsymbol{E}$ | |
| \bbF | $\boldsymbol{F}$ | |
| \bbG | $\boldsymbol{G}$ | |
| \bbSpBA | $\mathcal{D}(\mathcal{B};\mathcal{A})$ | **to write** |
| \bbSpAB | $\mathcal{D}(\mathcal{A};\mathcal{B})$ | **to write** |

common/blackboxes/deprecated *Deprecated*

| | | |
|---|---|---|
| \bbOp | $\oplus$ | Composition operation |
| \inSeries | Series | Series of two systems |

common/boot *Bootstrapping symbols*

common/boot/obscmd *Observations and commands*

| | | |
|---|---|---|
| \world | $\boldsymbol{w}$ | The "world", an element of $\mathcal{D}(\mathcal{Y};\mathcal{U})$. |
| \obs | $\boldsymbol{y}$ | Observations. |
| \obse | $y$ | Observations (element) – also called "sensel" |
| \cmd | $\boldsymbol{u}$ | Commands, in general. |
| \cmde | $u$ | Commands (element) – also called "?". |
| \nobs | $n_{\boldsymbol{y}}$ | Number of sensels |
| \ncmd | $n_{\boldsymbol{u}}$ | Number of actuators |
| \obsSp | $\mathcal{Y}$ | Observation space |
| \cmdSp | $\mathcal{U}$ | Commands space |
| \cmdSph | $\overline{\mathcal{U}}$ | Domain of a single actuator $\mathcal{U} = \overline{\mathcal{U}}^{n_{\boldsymbol{u}}}$. |
| \obsSph | $\overline{\mathcal{Y}}$ | Domain of a single sensel $\mathcal{Y} = \overline{\mathcal{Y}}^{n_{\boldsymbol{y}}}$. |
| \obsSphd | $d^{\overline{\mathcal{Y}}}$ | Metric on $d^{\overline{\mathcal{Y}}}$ |
| \obsSpd | $d^{\mathcal{Y}}$ | Metric on $d^{\mathcal{Y}}$ |

common/boot/spatialsensors *Spatial sensors*

| | | |
|---|---|---|
| \obssp | $\mathcal{S}$ | Observation physical space. |
| \obsps | $\mathcal{S}$ | Observation physical space. |
| \genimages | Images | Images on physical space $\mathcal{S}$. |

| | | |
|---|---|---|
| \imps | $\mathsf{Images}(\mathcal{S})$ | Images on physical space $\mathcal{S}$. |

| common/boot/servo | *Servoing* | |
|---|---|---|
| \obsg | $\check{\boldsymbol{y}}$ | Goal observations. |
| \obsge | $\check{y}$ | Goal observations (element). |
| \obsgl | $\check{\boldsymbol{z}}$ | Goal observations (element). |
| \obsgle | $\check{z}$ | Goal observations (element). |

| common/boot/abbreviations | *Abbreviations* | |
|---|---|---|
| \bbSpYU | $\mathcal{D}(\mathcal{Y};\mathcal{U})$ | **to write** |
| \bbSpUY | $\mathcal{D}(\mathcal{U};\mathcal{Y})$ | **to write** |
| \bbSpInvY | $\mathcal{D}^\star(\mathcal{Y})$ | Representation nuisances on commands |
| \bbSpInvU | $\mathcal{D}^\star(\mathcal{U})$ | Representation nuisances on observations |
| \bbSpInvYU | $\mathcal{D}^\star(\mathcal{Y};\mathcal{U})$ | Representation nuisances |
| \bbSpInvUY | $\mathcal{D}^\star(\mathcal{U};\mathcal{Y})$ | |
| \bbSpCoreYU | $\mathcal{D}^\circ(\mathcal{Y};\mathcal{U})$ | Systems up to representation |

| common/expressions | *Miscellaneous expressions* | |
|---|---|---|
| \etal | *et. al.* | |
| \eg | *e.g.*, | |
| \etc | *etc.* | |
| \ie | *i.e.*, | |
| \ala | *à la* | |
| \viceversa | *vice versa* | |
| \vs | *vs* | Versus |
| \adhoc | *ad hoc* | |
| \apriori | *a priori* | |

| common/goodformulas | *Better formulas annotations* | |
|---|---|---|
| \expl{...} | | Explanation in formulas |
| \highA{...} | | Highlight something in formulas (observations) |
| \highB{...} | | Highlight something in formulas (commands) |
| \highC{...} | | both observations and commands |

| common/yesorno | *Miscellaneous functions for document formatting* | |
|---|---|---|
| \ns | | |
| \tickYes | ✓ | |
| \tickNo | 7 | |
| \NA | $n/a$ | |
| \coltickNo | 7 | |
| \yes | ✓ | |
| \no | 7 | |
| \onehalf | $\frac{1}{2}$ | small one half |
| \smPO | $+1$ | Small plus one |
| \smMO | $-1$ | Small minus one (e.g. in smallmatrix) |

| common/incomplete | *Incomplete symbols* | |
|---|---|---|
| \AC{...} | | Marker for sections to write |
| \ac{...} | | |
| \towrite | **to write** | Marker for sections to write |
| \placeholder{...,...} | | A placeholder |

| | | |
|---|---|---|
| \tocite{...} | | |
| \citeboh | $[xxx]$ | |
| \xxx | *???* | |
| \notsure | **(Not sure...)** | |
| \dontlike | **(Don't like this)** | |
| \notformal | **(not formal)** | |
| \betterword{...} | | |
| \boh | *???* | incomplete |
| \bn | | bad notation, this should change later |
| \checkbadformat | | incomplete |
| \prooftowritesomeday | | |
| \myrule{...,...} | | |
| \unitInverval | $[0,1]$ | |

| common/geometry | *Differential geometry* | |
|---|---|---|
| \diff | $\mathsf{Diff}$ | Diffeomorphism |
| | | $\mathsf{Diff}(\mathcal{M})$ are the diffeomeorphisms from $\mathcal{M}$ to its<br>`$\diff(\aset{M})$ are the diffeomeorphisms from $\aset{M}$ to itself.` |
| \diffPos | $\mathsf{Diff}_+$ | Orientation-preserving diffeomorphism. |
| \homeoPos | $\mathsf{Homeo}_+$ | Orientation-preserving homeomorphisms (of the |
| \diffBounded{...} | | Diffeomorphisms with bounded curvature |
| \diffVol | $\mathsf{Diff}_{\mathrm{vol}}$ | |
| \homeo | $\mathsf{Homeo}$ | Set of all homeomorphisms |
| \isometries | $\mathsf{Isom}$ | Isometries group |
| | | $\mathsf{Isom}(\mathcal{M})$ are all the isometries of $\mathcal{M}$.<br>`$\isometries(\aset{M})$ are all the isometries of $\aset{M}$.` |
| \diffFix{...} | | Diffeomorphisms that fix a point |
| \conformalFuncs | $\mathsf{Conformal}$ | Conformal transformations |

| common/geometry/manifolds | *Manifolds* | |
|---|---|---|
| \Sone | $\mathbb{S}^1$ | Unit circle. |
| \Stwo | $\mathbb{S}^2$ | Unit sphere. |
| \stwo | $\mathbb{S}^2$ | Unit sphere |
| \hypsp | $\mathbb{H}$ | |
| \hypspn | $\mathbb{H}^n$ | |

| common/groups | *Group theory* | |
|---|---|---|
| \gIdentity | $e$ | Identity of a group |
| \tgroup | $\mathsf{group}$ | Group set with operations |
| | | $\mathsf{group}(\mathrm{G},\cdot)$ means G is a group under $\cdot$.<br>`$\tgroup(\agroup{G},\cdot)$ means $\agroup{G}$ is group under $\cdot$.` |
| \haar | $\mathsf{haar}$ | Haar measure |
| | | The Haar measure on $\mathcal{X}$ is $\mathsf{haar}^{X}$.<br>`The Haar measure on $\aset{X}$ is ${\haar}{X}$.` |

| common/groups/famous | *Famous groups* | |
|---|---|---|
| \idGroup | $\mathsf{Id}$ | The trivial group with identity only. |

| | | |
|---|---|---|
| \permutations | Perm | Set of permutation |
| \stab{...} | | Stabilizer of a set |
| \functionsym{...} | | Symmetries of a function |
| \allsubgroups | AllSubgroups | |
| \comgroup{...} | | Commutator sub group |
| \groupJoin | $\vee$ | Group join |
| \groupconj{...} | | Conjugation |
| \groupquotient | / | Group quotient |
| \groupsemidir | $\rtimes$ | Semidirect product. |
| \groupisom | $\cong$ | Isomorphism |
| \issubgroup | $\leq$ | Subgroup relation. |
| \normalsub | $\triangleleft$ | Normal subgroup relation |
| \actionsymbol | $\cdot$ | Group action. |
| \companionFuncs{...} | | Companions functions |
| \transversalFuncs{...} | | Transversal functions |

| common/groups/matrix | *Matrix groups* | |
|---|---|---|
| \orthogroup | O | Orthogonal group. |
| \trangroup | T | Translation group |
| \segroup | SE | Special Euclidean group. |
| \Egroup | E | Euclidean group. |
| \SLgroup | SL | Special linear group |
| \Diaggroup | D | Diagonal matrices with non-zero elements. |
| \PMgroup | $\mathsf{D}_{\pm}$ | Diagonal matrices with $\pm 1$ on the diagonal. |
| \Scalegroup | Sc | Multiples of the identity |
| \sogroup | SO | Special orthogonal group. |
| \soneggroup | $\mathsf{SO}^{-}$ | |
| \affgroup | Aff | Affine group |
| \affgrouppos | $\mathsf{Aff}_{+}$ | Affine group |
| \GL | GL | General linear group |
| \GLpos | $\mathsf{GL}_{+}$ | |
| \se | se | Special Euclidean algebra |
| \soalgebra | so | |
| \sealgebra | se | Special Euclidean algebra |
| \sothree | SO(3) | Special orthogonal group (rotation matrices) |
| \sethree | SE(3) | Special Euclidean group |
| \setwo | SE(2) | Special Euclidean group |

| common/groups/simple | *Very simple groups* | |
|---|---|---|
| \mgroup | $(\mathbb{R}_{\circ}, \times)$ | Multiplication group |
| \mposgroup | $(\mathbb{R}_{\circ}^{+}, \times)$ | Positive multiplication group |
| \mpmgroup | $(\pm 1, \times)$ | +1/-1 multiplication group |
| \addgroup | $(\mathbb{R}, +)$ | Addition group |

| common/groups/simple/abbreviations | *Abbreviations* | |
|---|---|---|
| \addgroupn | $(\mathbb{R}^n, +)$ | Addition group on $\mathbb{R}^n$ |
| \affone | $\mathsf{Aff}(\mathbb{R})$ | Affine group 1D |
| \affonepos | $\mathsf{Aff}_{+}(\mathbb{R})$ | Affine group 1D |
| \affn | $\mathsf{Aff}(\mathbb{R}^n)$ | Affine group in $n$ dimensions. |
| \affnpos | $\mathsf{Aff}_{+}(\mathbb{R}^n)$ | Affine transformations preserving orientations. |

| common/probability | *Probability* | |
|---|---|---|
| \uniformdist | Uniform | Uniform distribution |
| \measuresupport | Support | Support of a probability measure |
| \processes | StocProcesses | Set of stochastic processes |
| \conditional | Conditional | Conditional distribution |
| | | Conditional$(\mathcal{B};\mathcal{A})$ is the set of conditional distr tions<br>`$\conditional(\setB;\setA)$ is the set of conditi distributions` |
| \finaldist | Final | Stationary distribution of a stochastic process. |
| \measureSp | meas | Measure space. |
| | | meas$(\mathcal{X},\Sigma,\mu)$ is a measure space.<br>`$\measureSp(\aset{X},\Sigma,\mu)$ is a measure sp` |
| \probSp | prob | Probability space. |
| | | prob$(\mathcal{X},\Sigma,\mu)$ is a probability space.<br>`$\probSp(\aset{X},\Sigma,\mu)$ is a probability space.` |
| \measures | ProbMeasures | Set of probability measures on a set. |
| | | Try $\mu^{\mathcal{X}} \in$ ProbMeasures$(\mathcal{X})$<br>`Try $\mu^{\aset{X}} \in \measures(\aset{X})$` |
| \dirac | $\delta$ | |

| common/robotics | *Robotics* | |
|---|---|---|
| \obsip | $m$ | Inner product bilinear form. |
| \obsosp | $\mathcal{O}$ | Observation output space. |
| \dummySensel | $s$ | |
| \pose | $\boldsymbol{q}$ | Robot pose $\boldsymbol{q} = (\boldsymbol{t}, \mathbf{R}) \in \mathcal{Q} \subset \mathrm{SE}(3)$. |
| \posesp | $\mathcal{Q}$ | Pose space, subgroup of SE(3). |
| \confspace | $\mathcal{Q}$ | Robot configuration space |
| \pos | $\boldsymbol{t}$ | Position in the world frame. |
| \rotm | $\mathbf{R}$ | Rotation matrix representing orientation in the |
| \lvel | $\boldsymbol{v}$ | Linear velocity |
| \lvele | $v$ | Linear velocity (element) |
| \avel | $\boldsymbol{\omega}$ | Angular velocity (as vector) |
| \avels | $\omega$ | Angular velocity in 2D (scalar) |
| \avelse | $\hat{\boldsymbol{\omega}}$ | Angular velocity (as skew-symmetric matrix) |
| \njoints | $n_j$ | Number of joints in a robot |
| \attitude | $\mathbf{R}$ | |
| \position | $\boldsymbol{t}$ | |

| common/robotics/fieldsmapler | *Field samplers* | |
|---|---|---|
| \field | $\mathcal{F}$ | Field sampled by the field sensor. |
| \fieldpos | $\boldsymbol{z}$ | Generic position in the world. |

| common/robotics/old | *Deprecated* |
|---|---|
| \wshape | $\boldsymbol{s}$ |
| \wpose | $\boldsymbol{p}$ |
| \worldsp | Maps |
| \wshapesp | Shapes |

| common/robotics/maps | *New stuff* | |
|---|---|---|
| \mshape | $\boldsymbol{s}$ | Map shape. |
| \mpose | $\boldsymbol{p}$ | Map pose. |
| \mshapesp | Shapes | Shape space. |
| \mapsp | Maps | Maps set $\mathsf{Maps} = \mathsf{Shapes} \times \mathrm{SE}(3)$. |

| common/statistics | *Misc statistics* | |
|---|---|---|
| \stddev | std | Standard deviation |
| \var | var | Variance |
| \ex | $\mathbb{E}$ | Expected value |
| \corr | corr | |
| \cov | cov | covariance |
| \spearcorr | spear | Spearman correlation between two variables |
| \mutualinf | $\mathcal{I}$ | Mutual information |
| \entr | $\mathcal{H}$ | Entropy |
| \varinf | $\mathcal{V}$ | Variation of information |
| \varinfn | $\mathcal{V}_1$ | Normalized variation of information |
| \pushedforward{...} | | Pushed forward notation |
| \distributedAs | $\sim$ | Distributed as |

| common/statistics/sorting | *Sorting vectors* | |
|---|---|---|
| \order | order | Order (or rank) of the elements of a vector. |
| \sorted | sorted | Sorted version of a vector |
| \differ | differ | |
| \sortedSeq | sortedSeq | |
| \weaksortedSeq | weaksortedSeq | |

| common/systems | *Dynamical systems* | |
|---|---|---|
| \CTI | CTI | Continuous-time time-invariant systems. |
| \DTI | DTI | Discrete-time time-invariant systems. |
| \DDTI | DDTI | Deterministic discrete-time time-invariant syste |
| \DCTI | CDTI | Deterministic continuous-time time-invariant sys |
| \DFSTI | DFSTI | Discrete-time finite-state-space time-invariant sy |
| \CFSTI | CFSTI | Continuous-time finite-state-space time-invariant |
| \DFSTIGO | DFSTIGO | Discrete-time finite-state-space time-invariant sy |
| \CLTI | CLTI | Continuous-time linear time-invariant systems |
| \CLTIG | CLTIG | Continuous-time linear time-invariant systems w |
| \DLTI | DLTI | Discrete-time linear time-invariant systems |
| \DSMPLTI | DSMPLTI | Discrete-time stable minimum-phase linear time- |
| \DLTIG | DLTIG | Discrete-time linear time-invariant systems with |
| \laptrans | $\mathcal{L}$ | Laplace transform |
| \impulseresp | ImpulseResp | Impulse response of a system |
| \transferfunc | TF | Transfer function |

| typography | *Basic typography* | |
|---|---|---|
| \myacronym{...} | | All acronyms; good for text as well as math mod |

| typography/tensors | *Tensors and tensor elements* | |
|---|---|---|
| \T{...} | | Tensor |
| \Tel{...} | | Tensor element |
| \Te{...} | | |

| typography/matrices | *Matrices and matrix elements* |
|---|---|
| \M{...} | A matrix |
| \Mel{...} | The elements of a matrix |

| typography/sets | *Sets* |
|---|---|
| \aset{...} | A set |
| \agroup{...} | Fonts for a set which is a group. |

A set $\mathcal{X}$, a group X, G, …

```
A set $\aset{X}$, a group $\agroup{X}$, $\agroup{
\dots
```

| | |
|---|---|
| \aseq{...} | Formatting for sequences |
| \aseqe{...} | Formatting for one element in a sequence |
| \dummyIndices | |

| typography/misc | *Everything else* |
|---|---|
| \aword{...} | How words should look like in formulas. |

Consider the operator scale, …

```
Consider the operator $\aword{scale}$, \dots
```

| | |
|---|---|
| \vmath{...} | How words should appear in math mode. |