

# DynamicNLPModels

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## **Part I**

# **Introduction**

## Chapter 1

# Introduction

Welcome to the documentation of [DynamicNLPModels.jl](#)

### **Warning**

This documentation page is under construction.

### **Note**

This documentation is also available in [PDF format](#).

## **Chapter 2**

### **What is DynamicNLPModels?**

## **Chapter 3**

### **Bug reports and support**

Please report issues and feature requests via the [Github issue tracker](#).

## **Part II**

### **Quick Start**

## **Part III**

# **API Manual**



## Chapter 4

# API Manual

[DynamicNLPModels.DenseLQDynamicBlocks](#) – Type.

Struct containing block A and B matrices used in creating the DenseLQDynamicModel. These matrices are given by Jerez, Kerrigan, and Constantinides in section 4 of "A sparse and condensed QP formulation for predictive control of LTI systems" (doi:10.1016/j.automatica.2012.03.010).

A is a ns(N+1) x ns matrix and B is a ns(N) x nu matrix containing the first column of the B block matrix in the above text. Note that the first block of zeros is omitted.

[source](#)

[DynamicNLPModels.DenseLQDynamicModel](#) – Method.

```
DenseLQDynamicModel(dnlp::LQDynamicData; implicit = false) -> DenseLQDynamicModel  
DenseLQDynamicModel(s0, A, B, Q, R, N; implicit = false ...) -> DenseLQDynamicModel
```

A constructor for building a DenseLQDynamicModel <: QuadraticModels.AbstractQuadraticModel

Input data is for the problem of the form

$$\text{minimize } \frac{1}{2} \sum_{i=0}^{N-1} (s_i^T Q s_i + 2u_i^T S^T x_i + u_i^T R u_i) + \frac{1}{2} s_N^T Q f s_N \text{ subject to } s_{i+1} = A s_i + B u_i \text{ for } i = 0, 1, \dots, N-1, u_i = K s_i$$

---

Data is converted to the form

$$\text{minimize } \frac{1}{2} u^T H u + h^T u + h_0 \text{ subject to } J z \leq g, u \leq u$$

Resulting H, J, h, and h0 matrices are stored within QuadraticModels.QPData as H, A, c, and c0 attributes respectively

If K is defined, then u variables are replaced by v variables. The bounds on u are transformed into algebraic constraints, and u can be queried by get\_u and get\_s within DynamicNLPModels.jl

Keyword argument implicit = false determines how the Jacobian is stored within the QPData. If implicit = false, the full, dense Jacobian matrix is stored. If implicit = true, only the first nu columns of the Jacobian are stored with the Linear Operator LQJacobianOperator.

[source](#)

**DynamicNLPModels.LQDynamicData** – Type.

```
| LQDynamicData{T,V,M,MK} <: AbstractLQDynData{T,V}
```

A struct to represent the features of the optimization problem

$$\underset{x}{\text{minimize}} \frac{1}{2} \sum_{i=0}^{N-1} (s_i^T Q s_i + 2u_i^T S^T x_i + u_i^T R u_i) + \frac{1}{2} s_N^T Q f s_N \text{ subject to } s_{i+1} = A s_i + B u_i \text{ for } i = 0, 1, \dots, N-1, u_i = K x_i$$

---

Attributes include:

- s0: initial state of system
- A : constraint matrix for system states
- B : constraint matrix for system inputs
- Q : objective function matrix for system states from 1:(N-1)
- R : objective function matrix for system inputs from 1:(N-1)
- N : number of time steps
- Qf: objective function matrix for system state at time N
- S : objective function matrix for system states and inputs
- ns: number of state variables
- nu: number of input variables
- E : constraint matrix for state variables
- F : constraint matrix for input variables
- K : feedback gain matrix
- sl: vector of lower bounds on state variables
- su: vector of upper bounds on state variables
- ul: vector of lower bounds on input variables
- uu: vector of upper bounds on input variables
- gl: vector of lower bounds on constraints
- gu: vector of upper bounds on constraints

see also LQDynamicData(s0, A, B, Q, R, N; ...)

[source](#)

**DynamicNLPModels.LQDynamicData** – Method.

```
| LQDynamicData(s0, A, B, Q, R, N; ...) -> LQDynamicData{T, V, M, MK}
```

A constructor for building an object of type LQDynamicData for the optimization problem

$$\underset{x}{\text{minimize}} \frac{1}{2} \sum_{i=0}^{N-1} (s_i^T Q s_i + 2u_i^T S^T x_i + u_i^T R u_i) + \frac{1}{2} s_N^T Q f s_N \text{ subject to } s_{i+1} = A s_i + B u_i \forall i = 0, 1, \dots, N-1, u_i = K x_i$$


---

- `s0`: initial state of system
- `A`: constraint matrix for system states
- `B`: constraint matrix for system inputs
- `Q`: objective function matrix for system states from 1:(N-1)
- `R`: objective function matrix for system inputs from 1:(N-1)
- `N`: number of time steps

The following attributes of the `LQDynamicData` type are detected automatically from the length of `s0` and size of `R`

- `ns`: number of state variables
- `nu`: number of input variables

The following keyword arguments are also accepted

- `Qf = Q`: objective function matrix for system state at time `N`; dimensions must be `ns x ns`
- `S = nothing`: objective function matrix for system state and inputs
- `E = zeros(eltype(Q), 0, ns)`: constraint matrix for state variables
- `F = zeros(eltype(Q), 0, nu)`: constraint matrix for input variables
- `K = nothing`: feedback gain matrix
- `sl = fill(-Inf, ns)`: vector of lower bounds on state variables
- `su = fill(Inf, ns)`: vector of upper bounds on state variables
- `ul = fill(-Inf, nu)`: vector of lower bounds on input variables
- `uu = fill(Inf, nu)`: vector of upper bounds on input variables
- `gl = fill(-Inf, size(E, 1))`: vector of lower bounds on constraints
- `gu = fill(Inf, size(E, 1))`: vector of upper bounds on constraints

[source](#)

`DynamicNLPModels.LQJacobianOperator` - Type.

```
| LQJacobianOperator{T, V, M}
```

Struct for storing the implicit Jacobian matrix. All data for the Jacobian can be stored in the first `nu` columns of `J`. This struct contains the needed data and storage arrays for calculating  $Jx$ ,  $J^T x$ , and  $J^T \text{Sigma } J$ .  $Jx$  and  $J^T x$  are performed through extensions to `LinearAlgebra.mul!()`.

---

Attributes

- `truncated_jac1`: Matrix of first `nu` columns of the Jacobian corresponding to  $Ax + Bu$  constraints
- `truncated_jac2`: Matrix of first `nu` columns of the Jacobian corresponding to state variable bounds
- `truncated_jac3`: Matrix of first `nu` columns of the Jacobian corresponding to input variable bounds
- `N`: number of time steps
- `nu`: number of inputs
- `nc`: number of algebraic constraints of the form  $gl \leq Es + Fu \leq gu$

- nsc: number of bounded state variables
- nuc: number of bounded input variables (if K is defined)
- SJ1: placeholder for storing data when calculating  $\Sigma J$
- SJ2: placeholder for storing data when calculating  $\Sigma J$
- SJ3: placeholder for storing data when calculating  $\Sigma J$
- H\_sub\_block: placeholder for storing data when adding  $J^T \Sigma J$  to the Hessian

source

`DynamicNLPModels.SparseLQDynamicModel` – Method.

```
SparseLQDynamicModel(dnlp::LQDynamicData)    -> SparseLQDynamicModel
SparseLQDynamicModel(s0, A, B, Q, R, N; ...) -> SparseLQDynamicModel
```

A constructor for building a `SparseLQDynamicModel` <: `QuadraticModels.AbstractQuadraticModel` Input data is for the problem of the form

$$\text{minimize } \frac{1}{2} \sum_{i=0}^{N-1} (s_i^T Q s_i + 2u_i^T S^T x_i + u_i^T R u_i) + \frac{1}{2} s_N^T Q f s_N \text{ subject to } s_{i+1} = A s_i + B u_i \text{ for } i = 0, 1, \dots, N-1, u_i = K s_i$$

---

Data is converted to the form

$$\text{minimize } \frac{1}{2} z^T H z \text{ subject to } l \leq J z \leq u \text{ and } l_{\text{var}} \leq z \leq u_{\text{var}}$$

Resulting H and J matrices are stored as `QuadraticModels.QPData` within the `SparseLQDynamicModel` struct and variable and constraint limits are stored within `NLPModels.NLPModelMeta`

If K is defined, then u variables are replaced by v variables, and u can be queried by `get_u` and `get_s` within `DynamicNLPModels.jl`

source

`DynamicNLPModels._set_sparse_H!` – Method.

```
_set_sparse_H!(H_colptr, H_rowval, H_nzval, Q, R, N; Qf = Q, S = zeros(T, size(Q, 1), size(R,
↪ 1))
```

set the data needed to build a `SparseArrays.SparseMatrixCSC` matrix. `H_colptr`, `H_rowval`, and `H_nzval` are set so that they can be passed to `SparseMatrixCSC()` to obtain the H matrix such that  $z^T H z = \sum_{i=1}^{N-1} s_i^T Q s_i + \sum_{i=1}^{N-1} u_i^T R u_i + s_N^T Q f s_N$ .

source

`DynamicNLPModels._set_sparse_J!` – Method.

```
_set_sparse_J!(J_colptr, J_rowval, J_nzval, A, B, E, F, K, bool_vec, N, nb)
_set_sparse_J!(J_colptr, J_rowval, J_nzval, A, B, E, F, K, N)
```

set the data needed to build a `SparseArrays.SparseMatrixCSC` matrix. `J_colptr`, `J_rowval`, and `J_nzval` are set so that they can be passed to `SparseMatrixCSC()` to obtain the Jacobian, J. The Jacobian contains the data for the following constraints:

$As_i + Bui = s\{i + 1\}$   $gl \leq Esi + Fui \leq getu$

If  $K$  is defined, then this matrix also contains the constraints  $ul \leq Kxi + vi \leq uu$

[source](#)

`DynamicNLPModels.add_jtsj!` - Method.

```
| add_jtsj!(H::M, Jac::LQJacobianOperator{T, V, M}, Σ::V, alpha::Number = 1, beta::Number = 1)
```

Generates  $Jac' \Sigma Jac$  and adds it to the matrix  $H$ .

$\alpha$  and  $\beta$  are scalar multipliers such  $\beta H + \alpha Jac' \Sigma Jac$  is stored in  $H$ , overwriting the existing value of  $H$

[source](#)

`DynamicNLPModels.get_A` - Method.

```
| get_A(LQDynamicData)
| get_A(SparseLQDynamicModel)
| get_A(DenseLQDynamicModel)
```

Return the value  $A$  from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_B` - Method.

```
| get_B(LQDynamicData)
| get_B(SparseLQDynamicModel)
| get_B(DenseLQDynamicModel)
```

Return the value  $B$  from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_E` - Method.

```
| get_E(LQDynamicData)
| get_E(SparseLQDynamicModel)
| get_E(DenseLQDynamicModel)
```

Return the value  $E$  from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_F` - Method.

```
| get_F(LQDynamicData)
| get_F(SparseLQDynamicModel)
| get_F(DenseLQDynamicModel)
```

Return the value  $F$  from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

**DynamicNLPModels.get\_K** – Method.

```
get_K(LQDynamicData)  
get_K(SparseLQDynamicModel)  
get_K(DenseLQDynamicModel)
```

Return the value K from LQDynamicData or SparseLQDynamicModel.dynamicdata or DenseLQDynamicModel.dynamicdata

[source](#)

**DynamicNLPModels.get\_N** – Method.

```
get_N(LQDynamicData)  
get_N(SparseLQDynamicModel)  
get_N(DenseLQDynamicModel)
```

Return the value N from LQDynamicData or SparseLQDynamicModel.dynamicdata or DenseLQDynamicModel.dynamicdata

[source](#)

**DynamicNLPModels.get\_Q** – Method.

```
get_Q(LQDynamicData)  
get_Q(SparseLQDynamicModel)  
get_Q(DenseLQDynamicModel)
```

Return the value Q from LQDynamicData or SparseLQDynamicModel.dynamicdata or DenseLQDynamicModel.dynamicdata

[source](#)

**DynamicNLPModels.get\_Qf** – Method.

```
get_Qf(LQDynamicData)  
get_Qf(SparseLQDynamicModel)  
get_Qf(DenseLQDynamicModel)
```

Return the value Qf from LQDynamicData or SparseLQDynamicModel.dynamicdata or DenseLQDynamicModel.dynamicdata

[source](#)

**DynamicNLPModels.get\_R** – Method.

```
get_R(LQDynamicData)  
get_R(SparseLQDynamicModel)  
get_R(DenseLQDynamicModel)
```

Return the value R from LQDynamicData or SparseLQDynamicModel.dynamicdata or DenseLQDynamicModel.dynamicdata

[source](#)

**DynamicNLPModels.get\_S** – Method.

```
get_S(LQDynamicData)  
get_S(SparseLQDynamicModel)  
get_S(DenseLQDynamicModel)
```

Return the value `S` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_gl` – Method.

```
| get_gl(LQDynamicData)
| get_gl(SparseLQDynamicModel)
| get_gl(DenseLQDynamicModel)
```

Return the value `gl` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_gu` – Method.

```
| get_gu(LQDynamicData)
| get_gu(SparseLQDynamicModel)
| get_gu(DenseLQDynamicModel)
```

Return the value `gu` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_jacobian` – Method.

```
| get_jacobian(lqdm::DenseLQDynamicModel) -> LQJacobianOperator
| get_jacobian(Jac::AdjointLinearOperator{T, LQJacobianOperator}) -> LQJacobianOperator
```

Gets the `LQJacobianOperator` from `DenseLQDynamicModel` (if the `QPdata` contains a `LQJacobianOperator`) or returns the `LQJacobianOperator` from the adjoint of the `LQJacobianOperator`

[source](#)

`DynamicNLPModels.get_ns` – Method.

```
| get_ns(LQDynamicData)
| get_ns(SparseLQDynamicModel)
| get_ns(DenseLQDynamicModel)
```

Return the value `ns` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_nu` – Method.

```
| get_nu(LQDynamicData)
| get_nu(SparseLQDynamicModel)
| get_nu(DenseLQDynamicModel)
```

Return the value `nu` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_s` – Method.

```
get_s(solution_ref, lqdm::SparseLQDynamicModel) -> s <: vector
get_s(solution_ref, lqdm::DenseLQDynamicModel) -> s <: vector
```

Query the solution  $s$  from the solver. If  $lqdm <: \text{SparseLQDynamicModel}$ , the solution is queried directly from `solution_ref.solution`. If  $lqdm <: \text{DenseLQDynamicModel}$ , then `solution_ref.solution` returns  $u$  (if  $K = \text{nothing}$ ) or  $v$  (if  $K <: \text{AbstractMatrix}$ ), and  $s$  is found from transforming  $u$  or  $v$  into  $s$  using  $A$ ,  $B$ , and  $K$  matrices.

[source](#)

`DynamicNLPModels.get_s0` – Method.

```
get_s0(LQDynamicData)
get_s0(SparseLQDynamicModel)
get_s0(DenseLQDynamicModel)
```

Return the value `s0` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_sl` – Method.

```
get_sl(LQDynamicData)
get_sl(SparseLQDynamicModel)
get_sl(DenseLQDynamicModel)
```

Return the value `sl` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_su` – Method.

```
get_su(LQDynamicData)
get_su(SparseLQDynamicModel)
get_su(DenseLQDynamicModel)
```

Return the value `su` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_u` – Method.

```
get_u(solution_ref, lqdm::SparseLQDynamicModel) -> u <: vector
get_u(solution_ref, lqdm::DenseLQDynamicModel) -> u <: vector
```

Query the solution  $u$  from the solver. If  $K = \text{nothing}$ , the solution for  $u$  is queried from `solution_ref.solution`. If  $K <: \text{AbstractMatrix}$ , `solution_ref.solution` returns  $v$ , and `get_u` solves for  $u$  using the  $K$  matrix (and the  $A$  and  $B$  matrices if  $lqdm <: \text{DenseLQDynamicModel}$ )

[source](#)

`DynamicNLPModels.get_ul` – Method.

```
get_ul(LQDynamicData)
get_ul(SparseLQDynamicModel)
get_ul(DenseLQDynamicModel)
```



Return the value `ul` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.get_uu` – Method.

```
get_uu(LQDynamicData)
get_uu(SparseLQDynamicModel)
get_uu(DenseLQDynamicModel)
```

Return the value `uu` from `LQDynamicData` or `SparseLQDynamicModel.dynamicdata` or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_A!` – Method.

```
set_A!(LQDynamicData, row, col, val)
set_A!(SparseLQDynamicModel, row, col, val)
set_A!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry `A[row, col]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_B!` – Method.

```
set_B!(LQDynamicData, row, col, val)
set_B!(SparseLQDynamicModel, row, col, val)
set_B!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry `B[row, col]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_E!` – Method.

```
set_E!(LQDynamicData, row, col, val)
set_E!(SparseLQDynamicModel, row, col, val)
set_E!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry `E[row, col]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_F!` – Method.

```
set_F!(LQDynamicData, row, col, val)
set_F!(SparseLQDynamicModel, row, col, val)
set_F!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry `F[row, col]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_K!` – Method.

```
set_K!(LQDynamicData, row, col, val)
set_K!(SparseLQDynamicModel, row, col, val)
set_K!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry  $K[\text{row}, \text{col}]$  to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_Q!` – Method.

```
set_Q!(LQDynamicData, row, col, val)
set_Q!(SparseLQDynamicModel, row, col, val)
set_Q!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry  $Q[\text{row}, \text{col}]$  to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_Qf!` – Method.

```
set_Qf!(LQDynamicData, row, col, val)
set_Qf!(SparseLQDynamicModel, row, col, val)
set_Qf!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry  $Qf[\text{row}, \text{col}]$  to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_R!` – Method.

```
set_R!(LQDynamicData, row, col, val)
set_R!(SparseLQDynamicModel, row, col, val)
set_R!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry  $R[\text{row}, \text{col}]$  to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_S!` – Method.

```
set_S!(LQDynamicData, row, col, val)
set_S!(SparseLQDynamicModel, row, col, val)
set_S!(DenseLQDynamicModel, row, col, val)
```

Set the value of entry  $S[\text{row}, \text{col}]$  to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_gl!` – Method.

```
set_gl!(LQDynamicData, index, val)
set_gl!(SparseLQDynamicModel, index, val)
set_gl!(DenseLQDynamicModel, index, val)
```

Set the value of entry `gl[index]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_gu!` – Method.

```
set_gu!(LQDynamicData, index, val)
set_gu!(SparseLQDynamicModel, index, val)
set_gu!(DenseLQDynamicModel, index, val)
```

Set the value of entry `gu[index]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_s0!` – Method.

```
set_s0!(LQDynamicData, index, val)
set_s0!(SparseLQDynamicModel, index, val)
set_s0!(DenseLQDynamicModel, index, val)
```

Set the value of entry `s0[index]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_sl!` – Method.

```
set_sl!(LQDynamicData, index, val)
set_sl!(SparseLQDynamicModel, index, val)
set_sl!(DenseLQDynamicModel, index, val)
```

Set the value of entry `sl[index]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_su!` – Method.

```
set_su!(LQDynamicData, index, val)
set_su!(SparseLQDynamicModel, index, val)
set_su!(DenseLQDynamicModel, index, val)
```

Set the value of entry `su[index]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

`DynamicNLPModels.set_ul!` – Method.

```
set_ul!(LQDynamicData, index, val)
set_ul!(SparseLQDynamicModel, index, val)
set_ul!(DenseLQDynamicModel, index, val)
```

Set the value of entry `ul[index]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

[DynamicNLPModels.set\\_uu!](#) – Method.

```
| set_uu!(LQDynamicData, index, val)  
| set_uu!(SparseLQDynamicModel, index, val)  
| set_uu!(DenseLQDynamicModel, index, val)
```

Set the value of entry `uu[index]` to `val` for `LQDynamicData`, `SparseLQDynamicModel.dynamicdata`, or `DenseLQDynamicModel.dynamicdata`

[source](#)

[LinearOperators.reset!](#) – Method.

```
| LinearOperators.reset!(Jac::LQJacobianOperator{T, V, M})
```

Resets the values of attributes `SJ1`, `SJ2`, and `SJ3` to zero

[source](#)