

# Package: multbxxc (via r-universe)

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**Type** Package

**Title** Auxiliary Routines for Influx Software

**Version** 1.0.3

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**Description** Contains auxiliary routines for influx software. This packages is not intended to be used directly. Influx was published here: Sokol et al. (2012) <[doi:10.1093/bioinformatics/btr716](https://doi.org/10.1093/bioinformatics/btr716)>.

**License** GPL (>= 2)

**Imports** Rcpp (>= 1.0.0)

**LinkingTo** Rcpp, RcppArmadillo, rmumps

**Depends** R (>= 3.4), rmumps (>= 5.2.1-6)

**URL** <https://github.com/sgsokol/influx/>

**RoxygenNote** 7.3.1

**Encoding** UTF-8

**Suggests** slam, testthat

**NeedsCompilation** yes

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**Repository** <https://sgsokol.r-universe.dev>

**RemoteUrl** <https://github.com/cran/multbxxc>

**RemoteRef** HEAD

**RemoteSha** a929150c98f8dc4c75316cb81109685441b6f819

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bop	<i>Bloc Operation in Place</i>
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### Description

src array is added (if sop=="+=") to dst[...] or any other manipulation is made according to sop parameter Both arrays are supposed to be of type 'double' The operation is done 'in place' without new memory allocation for dst src is reshaped and possibly replicated to fit the designated block of dst. mv can be:

- a 1 or 3 component vector describing the block: 1-margin number of dst, 2-offset, 3-length if only the margin is present than offset is 0 and length is the total length of this margin
- a matrix of indexes. Its column number must be equal to the length(dim(dst)) each row of this matrix is a multidimensional index in dst array.

sop is one off: "=" (copy src to dst[]), "+=", "-=", "\*=", "/="

### Usage

```
bop(dst, mv, sop, src)
```

### Arguments

dst	A numeric array, destination
mv	An integer vector or matrix, describe margins to operate on
sop	A string, describes an operator to apply
src	A numeric array, source (may be replicated to fit the size of dst)

### Value

None

**Examples**

```

a=matrix(1, 3, 3) # 3x3 matrix of 1's
b=1:3
bop(a, 2, "+=", b) # a += b, here b will be repeated
a
#      [,1] [,2] [,3]
# [1,]  2   2   2
# [2,]  3   3   3
# [3,]  4   4   4

```

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ij2ijv\_i

*Transform Repeated Matrix Indexes*


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**Description**

Transforms a couple of index vectors `ir` and `jc` (`ij` of a sparse matrix) with possibly repeated values into sparse indexes `ij` and a vector of 1d indexes of non zero values. The response can be then used for repeated creation of sparse matrices with the same pattern by calling `iv2v()` `ir` and `jc` are supposed to be sorted in increasing order, column-wise (`ic` runs first)

**Usage**

```
ij2ijv_i(ir, jc)
```

**Arguments**

<code>ir</code>	An integer vector, row indexes
<code>jc</code>	An integer vector, column indexes

**Value**

A list with fields `i`, `j` and `iv`

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iv2v

*Sum non Zero Repeated Values*


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**Description**

sum values in `v` according to possibly repeated indexes in `iv`

**Usage**

```
iv2v(iv, v)
```

**Arguments**

iv	An integer vector, obtained with <code>ij2ijv_i(...)\$iv</code>
v	A numeric vector

**Value**

Numeric vector

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jrhs_ff	<i>Update Matrix by a Cascade of Dot Product</i>
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**Description**

Update Matrix by a Cascade of Dot Product

**Usage**

```
jrhs_ff(jrhs, ff, xpfw)
```

**Arguments**

jrhs	A sparse matrix of type slam
ff	A sparse matrix of type slam
xpfw	A numeric matrix

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match_ij	<i>Fast Match for Matrix Indexes</i>
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**Description**

Match ix,jx-couple in ti,tj-table and return their 1-based positions (0 for non matched couples)

**Usage**

```
match_ij(ix, jx, ti, tj)
```

**Arguments**

ix	An integer vector
jx	An integer vector
ti	An integer vector
tj	An integer vector

**Value**

An integer vector

**Examples**

```
match_ij(1:2, 1:2, 0:4, 0:4)
# [1] 2 3
```

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mm\_xpf

*Dot Product SparseMatrix\*DenseArray*


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**Description**

Dot product of simple triplet matrix  $x$  ( $m \times n$ ) (measurement matrix) and a dense array  $y$  ( $n \times k \times l$ ). Only slices of  $y_$  from  $l$ sel vector are used.

**Usage**

```
mm_xpf(x, y_, lsel)
```

**Arguments**

$x$	A list, sparse matrix of type slam
$y_$	A numeric 3d array
$l$ sel	An integer vector

**Value**

An array with dimensions ( $m \times \text{len}(l$ sel)  $\times k$ ), i.e. it is permuted on the fly.

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multbxxc

*multbxxc: Auxiliary Routines for Influx Software*


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**Description**

The multbxxc package provides a series C++ function most often operating inplace

**keyword**

metabolic flux analysis (MFA)

**Author(s)**

Serguei Sokol

**References**

Sokol et al. (2012) <doi:10.1093/bioinformatics/btr716>

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mult_bxxc	<i>Calculate Inplace a Series of Dot Product</i>
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**Description**

Calculate Inplace a Series of Dot Product

**Usage**

```
mult_bxxc(a, b, c)
```

**Arguments**

a	A dense array, the size of a is (nr_b, nc_c, ntico)
b	A sparse matrix (cf. <a href="#">simple_triplet_matrix</a> ) of size (nr_b*ntico, nc_b) given by its fields v, i, and j describing triplet storage.
c	A dense array, the size of c is (ldc, nc_c, ntico), ldc must be $\geq$ ncol(b)

**Value**

None

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redim	<i>New Dimensions</i>
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**Description**

Write new dimension vector while keeping the old memory

**Usage**

```
redim(x, di)
```

**Arguments**

x	A numeric array
di	An integer vector, new dimensions

**Value**

None

**Examples**

```

a=matrix(as.double(1:12), 6, 2)
redim(a, c(3, 4))
dim(a)
# [1] 3 4

```

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solve\_iou

*Solve ODE System by Implicite Euler Scheme*


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**Description**

The system is defined as  $M * dx/dt = a * x + s$  where  $M$  is a diagonal matrix given by its diagonal vector  $M$  (which has a form of matrix for term-by-term multiplication with  $x_0$ ) In discrete terms  $(M/dt_i - a) * x_i = (M/dt_i) * x_{i-1} + s_i$  The `rmumps` matrix  $(M/dt_i - a)$  is stored in list `ali` as `XPtr<Rmumps>` or a plain dense inverted matrix. Calculations are done in-place so `s` is modified and contains the solution on exit. The others parameters are not modified.

**Usage**

```

solve_iou(invdt, x0_, M, ali, s, ilua)

```

**Arguments**

<code>invdt</code>	A numeric vector, represents $1/dt$
<code>x0_</code>	A numeric matrix or <code>NULL</code> , is the starting value at $t_0$ ( <code>NULL</code> means 0)
<code>M</code>	A numeric matrix representing diagonal terms (masses)
<code>ali</code>	A list of matrices or <code>Rmumps</code> objects
<code>s</code>	A 3d numeric array, is the source term, its last margin corresponds to time. <code>s[, , i]</code> can be a matrix or a vector(== 1-column matrix)
<code>ilua</code>	An integer vector, <code>ilua[i]</code> gives the list index in <code>ali</code> for a given $dt_i$ . In such a way, <code>ali</code> may be shorter than time points.

**Value**

None

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