

Algorithm: $[A] := \text{SET_TO_ZERO_UNB_VAR1}(A)$

Partition

$A \rightarrow (A_L \mid A_R)$

where A_L has 0 columns

while $n(A_L) < n(A)$ **do**

Repartition

$(A_L \mid A_R) \rightarrow (A_0 \mid a_1 \mid A_2)$

where a_1 has 1 column

$a_1 := 0$ (Set the current column to zero)

Continue with

$(A_L \mid A_R) \leftarrow (A_0 \mid a_1 \mid A_2)$

endwhile

```

function [ A_out ] = Set_to_zero_unb_var1( A )

[ AL, AR ] = FLA_Part_1x2( A, ...
                           0, 'FLA_LEFT' );

while ( size( AL, 2 ) < size( A, 2 ) )

    [ A0, a1, A2 ] = FLA_Repart_1x2_to_1x3( AL, AR, ...
                                             1, 'FLA_RIGHT' );

    %-----%

    a1 = laff_zerov( a1 );

    %-----%

    [ AL, AR ] = FLA_Cont_with_1x3_to_1x2( A0, a1, A2, ...
                                           'FLA_LEFT' );

end

A_out = [ AL, AR ];

return

```

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Algorithm: $[A] := \text{SET_TO_ZERO_UNB_VAR2}(A)$

Partition

$$A \rightarrow \left(\frac{A_T}{A_B} \right)$$

where A_T has 0 rows

while $m(A_T) < m(A)$ **do**

Repartition

$$\left(\frac{A_T}{A_B} \right) \rightarrow \left(\frac{\frac{A_0}{a_1^T}}{A_2} \right)$$

where a_1 has 1 row

$$a_1^T := 0$$

Continue with

$$\left(\frac{A_T}{A_B} \right) \leftarrow \left(\frac{\frac{A_0}{a_1^T}}{A_2} \right)$$

endwhile

```

function [ A_out ] = Set_to_zero_unb_var2( A )

[ AT, ...
  AB ] = FLA_Part_2x1( A, ...
                      0, 'FLA.TOP' );

while ( size( AT, 1 ) < size( A, 1 ) )

    [ A0, ...
      alt, ...
      A2 ] = FLA_Repart_2x1_to_3x1( AT, ...
                                    AB, ...
                                    1, 'FLA.BOTTOM' );

    %-----%

    alt = laff_zerov( alt );

    %-----%

    [ AT, ...
      AB ] = FLA_Cont_with_3x1_to_2x1( A0, ...
                                       alt, ...
                                       A2, ...
                                       'FLA.TOP' );

end

A_out = [ AT
          AB ];

return

```

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Algorithm: $[A] := \text{SET_TO_IDENTITY_UNB_VAR1}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{01} := 0$$

$$\alpha_{11} := 1$$

$$a_{21} := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_identity_unb_var1( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,    A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    %-----%

    a01 = laff_zerov( a01 );
    alpha11 = laff_onev( alpha11 );
    a21 = laff_zerov( a21 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,    A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,    A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_identity_unb_var1.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_IDENTITY_UNB_VAR2}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{10}^T := 0$$

$$\alpha_{11} := 1$$

$$a_{12}^T := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_identity_unb_var2( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,    A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    %-----%

    a10t = laff_zerov( a10t );
    alpha11 = laff_onev( alpha11 );
    a12t = laff_zerov( a12t );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,    A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,    A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_identity_unb_var2.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_IDENTITY_UNB_VAR3}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{01} := 0$$

$$\alpha_{11} := 1$$

$$a_{10}^T := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_identity_unb_var3( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,    A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    %-----%

    a01 = laff_zerov( a01 );
    alpha11 = laff_onev( alpha11 );
    a01t = laff_zerov( a01t );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,    A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,    A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

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Algorithm: $[A] := \text{SET_TO_IDENTITY_UNB_VAR4}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{12}^T := 0$$

$$\alpha_{11} := 1$$

$$a_{21} := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_identity_unb_var4( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01, A02, ...
      a10t, alpha11, a12t, ...
      A20, a21, A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                ABL, ABR, ...
                                                1, 1, 'FLA_BR' );

    %-----%

    a12t = laff_zerov( a12t );
    alpha11 = laff_onev( alpha11 );
    a21 = laff_zerov( a21 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01, A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20, a21, A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_identity_unb_var4.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_DIAGONAL_MATRIX_UNB_VAR1}(A, x)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right)$$

where A_{TL} is 0×0 , x_T has 0 rows

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

where α_{11} is 1×1 , χ_1 has 1 row

$$a_{01} := 0$$

$$\alpha_{11} := \chi_1$$

$$a_{21} := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_diagonal_matrix_unb_var1( A, x )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

[ xT, ...
  xB ] = FLA_Part_2x1( x, ...
                      0, 'FLA_TOP' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01,      A02, ...
      a10t, alpha11, a12t, ...
      A20, a21,      A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    [ x0, ...
      chi1, ...
      x2 ] = FLA_Repart_2x1_to_3x1( xT, ...
                                    xB, ...
                                    1, 'FLA_BOTTOM' );

    %-----%

    a01 = laff_zerov( a01 );
    alpha11 = laff_copy( chi1, alpha11 );
    a21 = laff_zerov( a21 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01,      A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20, a21,      A22, ...
                                              'FLA_TL' );

    [ xT, ...
      xB ] = FLA_Cont_with_3x1_to_2x1( x0, ...
                                       chi1, ...
                                       x2, ...
                                       'FLA_TOP' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

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Algorithm: $[A] := \text{SET_TO_DIAGONAL_MATRIX_UNB_VAR2}(A, x)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right)$$

where A_{TL} is 0×0 , x_T has 0 rows

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

where α_{11} is 1×1 , χ_1 has 1 row

$$a_{10}^T := 0$$

$$\alpha_{11} := \chi_1$$

$$a_{12}^T := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_diagonal_matrix_unb_var2( A, x )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

[ xT, ...
  xB ] = FLA_Part_2x1( x, ...
                       0, 'FLA_TOP' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01,      A02, ...
      a10t, alpha11, a12t, ...
      A20, a21,      A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    [ x0, ...
      chi1, ...
      x2 ] = FLA_Repart_2x1_to_3x1( xT, ...
                                    xB, ...
                                    1, 'FLA_BOTTOM' );

    %-----%

    a10t = laff_zerov( a10t );
    alpha11 = laff_copy( chi1, alpha11 );
    a12t = laff_zerov( a12t );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01,      A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20, a21,      A22, ...
                                              'FLA_TL' );

    [ xT, ...
      xB ] = FLA_Cont_with_3x1_to_2x1( x0, ...
                                       chi1, ...
                                       x2, ...
                                       'FLA_TOP' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

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Algorithm: $[A] := \text{SET_TO_DIAGONAL_MATRIX_UNB_VAR3}(A, x)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right)$$

where A_{TL} is 0×0 , x_T has 0 rows

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

where α_{11} is 1×1 , χ_1 has 1 row

$$a_{01} := 0$$

$$\alpha_{11} := \chi_1$$

$$a_{10}^T := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_diagonal_matrix_unb_var3( A, x )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

[ xT, ...
  xB ] = FLA_Part_2x1( x, ...
                      0, 'FLA_TOP' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01,      A02, ...
      a10t, alpha11, a12t, ...
      A20, a21,      A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    [ x0, ...
      chi1, ...
      x2 ] = FLA_Repart_2x1_to_3x1( xT, ...
                                    xB, ...
                                    1, 'FLA_BOTTOM' );

    %-----%

    a01 = laff_zerov( a01 );
    alpha11 = laff_copy( chi1, alpha11 );
    a10t = laff_zerov( a10t );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01,      A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20, a21,      A22, ...
                                              'FLA_TL' );

    [ xT, ...
      xB ] = FLA_Cont_with_3x1_to_2x1( x0, ...
                                       chi1, ...
                                       x2, ...
                                       'FLA_TOP' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_diagonal_matrix_unb_var3.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_DIAGONAL_MATRIX_UNB_VAR4}(A, x)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right)$$

where A_{TL} is 0×0 , x_T has 0 rows

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

where α_{11} is 1×1 , χ_1 has 1 row

$$a_{12}^T := 0$$

$$\alpha_{11} := \chi_1$$

$$a_{21} := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array} \right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_diagonal_matrix_unb_var4( A, x )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

[ xT, ...
  xB ] = FLA_Part_2x1( x, ...
                      0, 'FLA_TOP' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01,      A02, ...
      a10t, alpha11, a12t, ...
      A20, a21,      A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    [ x0, ...
      chi1, ...
      x2 ] = FLA_Repart_2x1_to_3x1( xT, ...
                                    xB, ...
                                    1, 'FLA_BOTTOM' );

    %-----%

    a12t = laff_zerov( a12t );
    alpha11 = laff_copy( chi1, alpha11 );
    a21 = laff_zerov( a21 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01,      A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20, a21,      A22, ...
                                              'FLA_TL' );

    [ xT, ...
      xB ] = FLA_Cont_with_3x1_to_2x1( x0, ...
                                       chi1, ...
                                       x2, ...
                                       'FLA_TOP' );

end

A_out = [ ATL, ATR
         ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_diagonal_matrix_unb_var4.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_LOWER_TRIANGULAR_MATRIX_UNB_VAR1}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{01} := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_lower_triangular_matrix_unb_var1( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01, A02, ...
      a10t, alpha11, a12t, ...
      A20, a21, A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                ABL, ABR, ...
                                                1, 1, 'FLA_BR' );

    %-----%

    a01 := laff_zerov( a01 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01, A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20, a21, A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_lower_triangular_matrix_unb_var1.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_LOWER_TRIANGULAR_MATRIX_UNB_VAR2}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{12}^T := 0$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_lower_triangular_matrix_unb_var2( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,    A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    %-----%

    a12t := laff_zerov( a12t );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,    A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,    A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_lower_triangular_matrix_unb_var2.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_UNIT_LOWER_TRIANGULAR_MATRIX_UNB_VAR1}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{01} := 0$$

$$\alpha_{11} := 1$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_unit_lower_triangular_matrix_unb_var1( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,      A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,      A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                       ABL, ABR, ...
                                                       1, 1, 'FLA_BR' );

    %-----%

    a01 := laff_zerov( a01 );
    alpha11 := laff_onev( alpha11 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,      A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,      A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_unit_lower_triangular_matrix_unb_var1.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SET_TO_UNIT_UNIT_LOWER_TRIANGULAR_MATRIX_UNB_VAR2}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{12}^T := 0$$

$$\alpha_{11} := 1$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Set_to_unit_lower_triangular_matrix_unb_var2( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,      A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,      A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                       ABL, ABR, ...
                                                       1, 1, 'FLA_BR' );

    %-----%

    a12t := laff_zerov( a12t );
    alpha11 := laff_onev( alpha11 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,      A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,      A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Set_to_unit_lower_triangular_matrix_unb_var2.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[B] := \text{TRANSPOSE_UNB}(A, B)$

Partition

$$A \rightarrow (A_L \mid A_R), B \rightarrow \left(\frac{B_T}{B_B} \right)$$

where A_L has 0 columns, B_T has 0 rows

while $n(A_L) < n(A)$ **do**

Repartition

$$(A_L \mid A_R) \rightarrow (A_0 \mid a_1 \mid A_2), \left(\frac{B_T}{B_B} \right) \rightarrow \left(\frac{B_0}{\frac{b_1^T}{B_2}} \right)$$

where a_1 has 1 column, b_1 has 1 row

$$b_1^T := a_1^T \quad (\text{Set the current row of } B \text{ to the current column of } A)$$

Continue with

$$(A_L \mid A_R) \leftarrow (A_0 \mid a_1 \mid A_2), \left(\frac{B_T}{B_B} \right) \leftarrow \left(\frac{B_0}{\frac{b_1^T}{B_2}} \right)$$

endwhile

```

function [ B_out ] = Transpose_unb_var1( A, B )

[ AL, AR ] = FLA_Part_1x2( A, ...
                           0, 'FLA_LEFT' );

[ BT, ...
  BB ] = FLA_Part_2x1( B, ...
                      0, 'FLA_TOP' );

while ( size( AL, 2 ) < size( A, 2 ) )

    [ A0, a1, A2 ] = FLA_Repart_1x2_to_1x3( AL, AR, ...
                                             1, 'FLA_RIGHT' );

    [ B0, ...
      b1t, ...
      B2 ] = FLA_Repart_2x1_to_3x1( BT, ...
                                    BB, ...
                                    1, 'FLA_BOTTOM' );

    %-----%

    b1t = laff_copy( a1, b1t );

    %-----%

    [ AL, AR ] = FLA_Cont_with_1x3_to_1x2( A0, a1, A2, ...
                                             'FLA_LEFT' );


    [ BT, ...
      BB ] = FLA_Cont_with_3x1_to_2x1( B0, ...
                                       b1t, ...
                                       B2, ...
                                       'FLA_TOP' );

end

B_out = [ BT
          BB ];

return

```

 Click to view .m file Transpose_unb_var1.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[B] := \text{TRANSPOSE_ALTERNATIVE_UNB}(A, B)$

Partition

$$A \rightarrow \left(\frac{A_T}{A_B} \right), B \rightarrow (B_L \mid B_R)$$

where A_T has 0 rows, B_L has 0 columns

while $m(A_T) < m(A)$ **do**

Repartition

$$\left(\frac{A_T}{A_B} \right) \rightarrow \left(\frac{\frac{A_0}{a_1^T}}{A_2} \right), (B_L \mid B_R) \rightarrow (B_0 \mid b_1 \mid B_2)$$

where a_1 has 1 row, b_1 has 1 column

Continue with

$$\left(\frac{A_T}{A_B} \right) \leftarrow \left(\frac{\frac{A_0}{a_1^T}}{A_2} \right), (B_L \mid B_R) \leftarrow (B_0 \mid b_1 \mid B_2)$$

endwhile

```

function [ B_out ] = Transpose_unb_var2( A, B )

[ AT, ...
  AB ] = FLA_Part_2x1( A, ...
                      0, 'FLA_TOP' );

[ BL, BR ] = FLA_Part_1x2( B, ...
                          0, 'FLA_LEFT' );

while ( size( AT, 1 ) < size( A, 1 ) )

    [ A0, ...
      alt, ...
      A2 ] = FLA_Repart_2x1_to_3x1( AT, ...
                                    AB, ...
                                    1, 'FLA_BOTTOM' );

    [ B0, b1, B2 ] = FLA_Repart_1x2_to_1x3( BL, BR, ...
                                             1, 'FLA_RIGHT' );

    %-----%

    b1 = laff_copy( alt, b1 );

    %-----%

    [ AT, ...
      AB ] = FLA_Cont_with_3x1_to_2x1( A0, ...
                                       alt, ...
                                       A2, ...
                                       'FLA_TOP' );


    [ BL, BR ] = FLA_Cont_with_1x3_to_1x2( B0, b1, B2, ...
                                           'FLA_LEFT' );

end

B_out = [ BL, BR ];

return

```

 Click to view .m file Transpose_unb_var2.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SYMMETRIZE_FROM_LOWER_TRIANGLE_UNB_VAR1}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{01} := (a_{10}^T)^T$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Symmetrize_from_lower_triangle_unb_var1( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,    A02, ...
      a10t, alpha11, a12t, ...
      A20,  a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    %-----%

    a01 = laff_copy( a10t, a01 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,    A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,    A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file `Symmetrize_from_lower_triangle_unb_var1.m`. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SYMMETRIZE_FROM_LOWER_TRIANGLE_UNB_VAR2}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{12}^T := a_{21}^T$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Symmetrize_from_lower_triangle_unb_var2( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01, A02, ...
      a10t, alpha11, a12t, ...
      A20, a21, A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                ABL, ABR, ...
                                                1, 1, 'FLA_BR' );

    %-----%

    a12t = laff_copy( a21, a12t );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01, A02, ...
                                              a10t, alpha11, a12t, ...
                                              A20, a21, A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file `Symmetrize_from_lower_triangle_unb_var2.m`. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SYMMETRIZE_FROM_UPPER_TRIANGLE_UNB_VAR1}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{10}^T := a_{01}^T$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Symmetrize_from_upper_triangle_unb_var1( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,    A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    %-----%

    a10t = laff_copy( a01, a10t );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,    A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,    A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
         ABL, ABR ];

return

```

🔴 Click to view .m file `Symmetrize_from_upper_triangle_unb_var1.m`. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $[A] := \text{SYMMETRIZE_FROM_UPPER_TRIANGLE_UNB_VAR2}(A)$

Partition

$$A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$$

where A_{TL} is 0×0

while $m(A_{TL}) < m(A)$ **do**

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

where α_{11} is 1×1

$$a_{21} = (a_{12}^T)^T$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$$

endwhile

```

function [ A_out ] = Symmetrize_from_upper_triangle_unb_var2( A )

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                             0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00,  a01,    A02,  ...
      a10t, alpha11, a12t, ...
      A20,  a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                    ABL, ABR, ...
                                                    1, 1, 'FLA_BR' );

    %-----%

    a21 = laff_copy( a12t, a21 );

    %-----%

    [ ATL, ATR, ...
      ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00,  a01,    A02,  ...
                                              a10t, alpha11, a12t, ...
                                              A20,  a21,    A22, ...
                                              'FLA_TL' );

end

A_out = [ ATL, ATR
          ABL, ABR ];

return

```

🔴 Click to view .m file Symmetrize_from_upper_triangle_unb_var2.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $y := \text{MVMULT_N_UNB_VAR1}(A, x, y)$

Partition

$$A \rightarrow \begin{pmatrix} A_T \\ A_B \end{pmatrix}, y \rightarrow \begin{pmatrix} y_T \\ y_B \end{pmatrix}$$

where A_T is $0 \times n$ and y_T is 0×1

while $m(A_T) < m(A)$ **do**

Repartition

$$\begin{pmatrix} A_T \\ A_B \end{pmatrix} \rightarrow \begin{pmatrix} A_0 \\ \frac{A_T}{a_1} \\ A_2 \end{pmatrix}, \begin{pmatrix} y_T \\ y_B \end{pmatrix} \rightarrow \begin{pmatrix} y_0 \\ \frac{y_T}{\psi_1} \\ y_2 \end{pmatrix}$$

where a_1 is a row

$$\psi_1 := a_1^T x + \psi_1$$

Continue with

$$\begin{pmatrix} A_T \\ A_B \end{pmatrix} \leftarrow \begin{pmatrix} A_0 \\ \frac{A_T}{a_1} \\ A_2 \end{pmatrix}, \begin{pmatrix} y_T \\ y_B \end{pmatrix} \leftarrow \begin{pmatrix} y_0 \\ \frac{y_T}{\psi_1} \\ y_2 \end{pmatrix}$$

endwhile

```

function [ y_out ] = mvmult_n_unb_var1( A, x, y )

[ AT, ...
  AB ] = FLA_Part_2x1( A, ...
                      0, 'FLA.TOP' );

[ yT, ...
  yB ] = FLA_Part_2x1( y, ...
                      0, 'FLA.TOP' );

while ( size( AT, 1 ) < size( A, 1 ) )

    [ A0, ...
      alt, ...
      A2 ] = FLA_Repart_2x1_to_3x1( AT, ...
                                    AB, ...
                                    1, 'FLA.BOTTOM' );

    [ y0, ...
      psi1, ...
      y2 ] = FLA_Repart_2x1_to_3x1( yT, ...
                                    yB, ...
                                    1, 'FLA.BOTTOM' );

    %-----%

    psi1 = laff_dots( alt, x, psi1 );

    %-----%

    [ AT, ...
      AB ] = FLA_Cont_with_3x1_to_2x1( A0, ...
                                       alt, ...
                                       A2, ...
                                       'FLA.TOP' );


    [ yT, ...
      yB ] = FLA_Cont_with_3x1_to_2x1( y0, ...
                                       psi1, ...
                                       y2, ...
                                       'FLA.TOP' );

end

y_out = [ yT
          yB ];

return

```

 Click to view .m file mvmult_n_unb_var1.m. Then copy and paste it into PictureFlame to watch it in action.

Algorithm: $y := \text{MVMULT_N_UNB_VAR2}(A, x, y)$

Partition

$$A \rightarrow (A_L \mid A_R), x \rightarrow \begin{pmatrix} x_T \\ x_B \end{pmatrix}$$

where A_L is $m \times 0$ and x_T is 0×1

while $m(x_T) < m(x)$ **do**

Repartition

$$(A_L \mid A_R) \rightarrow (A_0 \mid a_1 \mid A_2), \begin{pmatrix} x_T \\ x_B \end{pmatrix} \rightarrow \begin{pmatrix} x_0 \\ \chi_1 \\ x_2 \end{pmatrix}$$

where a_1 is a column

$$y := \chi_1 a_1 + y$$

Continue with

$$(A_L \mid A_R) \leftarrow (A_0 \mid a_1 \mid A_2), \begin{pmatrix} x_T \\ x_B \end{pmatrix} \leftarrow \begin{pmatrix} x_0 \\ \chi_1 \\ x_2 \end{pmatrix}$$

endwhile

```

function [ y_out ] = mvmult_n_unb_var2( A, x, y )

[ AL, AR ] = FLA_Part_1x2( A, ...
                           0, 'FLA_LEFT' );

[ xT, ...
  xB ] = FLA_Part_2x1( x, ...
                      0, 'FLA_TOP' );

while ( size( AL, 2 ) < size( A, 2 ) )

    [ A0, a1, A2 ] = FLA_Repart_1x2_to_1x3( AL, AR, ...
                                             1, 'FLA_RIGHT' );

    [ x0, ...
      chi1, ...
      x2 ] = FLA_Repart_2x1_to_3x1( xT, ...
                                    xB, ...
                                    1, 'FLA_BOTTOM' );

    %-----%

    y = laff_axpy( chi1, a1, y );

    %-----%

    [ AL, AR ] = FLA_Cont_with_1x3_to_1x2( A0, a1, A2, ...
                                             'FLA_LEFT' );


    [ xT, ...
      xB ] = FLA_Cont_with_3x1_to_2x1( x0, ...
                                       chi1, ...
                                       x2, ...
                                       'FLA_TOP' );

end

y_out = y;

return

```

 Click to view .m file mvmult_n_unb_var2.m. Then copy and paste it into PictureFlame to watch it in action.