Step	Algorithm:		
1a			
4			
	where		
2			
3	while do		
2,3		٨	
5a			
	where		
6			
8			
5b			
7			
2			
	endwhile		
2,3		^ ¬(	)
1b			

Step	Algorithm: $[y] := SYMV_L_UNB_VAR1(A, x, y)$
1a	$y = \widehat{y}$
4	$A \to \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix}, x \to \begin{pmatrix} x_T \\ x_B \end{pmatrix}, y \to \begin{pmatrix} y_T \\ y_B \end{pmatrix}$ where $A_{TL}$ is $0 \times 0$ , $x_T$ has 0 rows, $y_T$ has 0 rows
2	$\left( rac{y_T}{y_B}  ight) = \left( rac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}  ight)$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge m(A_{TL}) < m(A)$
5a	$ \left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \to \left(\begin{array}{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) \to \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \to \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right) $
6	where $\alpha_{11}$ is $1 \times 1$ , $\chi_1$ has 1 row, $\psi_1$ has 1 row $ \begin{pmatrix} \underline{y_0} \\ \underline{\psi_1} \\ \underline{y_2} \end{pmatrix} = \begin{pmatrix} \underline{A_{00}x_0 + \widehat{y_0}} \\ \underline{\widehat{\psi_1}} \\ \underline{\widehat{y_2}} \end{pmatrix} $
8	$y_0 := (a_{10}^T)^T \chi_1 + y_0$ $\psi_1 := a_{10}^T x_0 + \alpha_{11} \chi_1 + \psi_1$
5b	$ \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BR} \end{vmatrix} \leftarrow \left(\frac{A_{00}}{a_{01}} \begin{vmatrix} a_{01} \\ a_{10} \end{vmatrix} \begin{vmatrix} A_{02} \\ a_{11} \end{vmatrix} , \left(\frac{x_T}{x_B}\right) \leftarrow \left(\frac{x_0}{\chi_1} \\ x_2 \end{vmatrix}, \left(\frac{y_T}{y_B}\right) \leftarrow \left(\frac{y_0}{\psi_1} \\ y_2 \end{vmatrix}\right) $
7	$ \left(\frac{y_0}{\psi_1}\right) = \left(\frac{A_{00}x_0 + (a_{10}^T)^T \chi_1 + \widehat{y}_0}{a_{10}^T x_0 + \alpha_{11}\chi_1 + \widehat{\psi}_1}\right) \\ \frac{\widehat{y}_2}{\widehat{y}_2} $
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
	endwhile
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \land \neg (m(A_{TL}) < m(A))$
1b	$y = Ax + \widehat{y}$

Algorithm:  $[y] := SYMV_LUNB_VAR1(A, x, y)$ 

$$A o \left(\frac{A_{TL}}{A_{BL}} \frac{A_{TR}}{A_{BR}}\right) , x o \left(\frac{x_T}{x_B}\right) , y o \left(\frac{y_T}{y_B}\right)$$

where  $A_{TL}$  is  $0 \times 0$ ,  $x_T$  has 0 rows,  $y_T$  has 0 rows

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

$$\left(\frac{A_{TL} | A_{TR}}{A_{BL} | A_{BR}}\right) \to \left(\frac{A_{00} | a_{01} | A_{02}}{a_{10}^T | \alpha_{11} | a_{12}^T}, \left(\frac{x_T}{x_B}\right) \to \left(\frac{x_0}{\chi_1}\right), \left(\frac{y_T}{y_B}\right) \to \left(\frac{y_0}{\psi_1}\right)$$

where  $\alpha_{11}$  is  $1 \times 1$ ,  $\chi_1$  has 1 row,  $\psi_1$  has 1 row

$$y_0 := (a_{10}^T)^T \chi_1 + y_0$$

$$\psi_1 := a_{10}^T x_0 + \alpha_{11} \chi_1 + \psi_1$$

$$\left(\frac{A_{TL} | A_{TR}}{A_{BL} | A_{BR}}\right) \leftarrow \left(\frac{A_{00} | a_{01} | A_{02}}{a_{10}^T | a_{11} | a_{12}^T}\right), \left(\frac{x_T}{x_B}\right) \leftarrow \left(\frac{x_0}{\chi_1}\right), \left(\frac{y_T}{y_B}\right) \leftarrow \left(\frac{y_0}{\psi_1}\right)$$

endwhile

Step	Algorithm: $[y] := SYMV_L_UNB_VAR1(A, x, y)$
1a	$y = \widehat{y}$
4	
1	
	where
2	
3	while do
2,3	^
5a	
	where
6	
8	
5b	
3.0	
7	
2	
	endwhile
2,3	$\wedge \neg ($
1b	$y = Ax + \widehat{y}$

1a $y = \hat{y}$ 4 where  2 $\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right)$ 3 while do  2,3 $\left(\frac{y_T}{y_D}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_D}\right) \wedge$ 5a where  6  8  5b  7  2 $\left(\frac{y_T}{y_D}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right)$ endwhile  2 $\left(\frac{y_T}{y_D}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_D}\right) \wedge$ 1b $y = Ax + \hat{y}$	Step	Algorithm: $[y] := SYMV_LUNB_VAR1(A, x, y)$
$ \begin{array}{c} \text{where} \\ 2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \\ 3  \text{while} \qquad \text{do} \\ 2,3  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge \\ 5a  \text{where} \\ 6  8  \\ 8  \\ 5b  \\ 7  \\ 2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \\ \text{endwhile} \\ 2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge \neg (  ) \end{array} $	1a	$y = \widehat{y}$
	4	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		
$ \begin{array}{ccc} 2,3 & \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \\ 5a & & & \\ &$	2	<del>                                   </del>
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3	while do
where $ \begin{array}{c} 6 \\ 8 \\ 5b \\ 7 \\ 2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \\ \text{endwhile} \\ 2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ( ) \end{array} $	2,3	
where $ \begin{array}{c} 6 \\ 8 \\ 5b \\ 7 \\ 2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \\ \text{endwhile} \\ 2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ( ) \end{array} $		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5a	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		
8  5b  7  2 $ \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right)$ endwhile  2 $ \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ($		where
8  5b  7  2 $ \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right)$ endwhile  2 $ \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ($	6	
5b $ \begin{array}{cccc} 7 & & & & & & \\ 2 & & \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) & & & \\ \text{endwhile} & & & & \\ 2 & & \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ( ) & & & \\ \end{array} $	O	
5b $ \begin{array}{cccc} 7 & & & & & & \\ 2 & & \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) & & & \\ \text{endwhile} & & & & \\ 2 & & \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ( ) & & & \\ \end{array} $		
7 $2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right)$ endwhile $2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ($	8	
7 $2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right)$ endwhile $2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ($		
$ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) $ endwhile $ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg (\qquad ) $	5b	
$ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) $ endwhile $ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg (\qquad ) $		
$ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) $ endwhile $ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg (\qquad ) $		
$ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) $ endwhile $ 2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg (\qquad ) $	7	
$ \frac{2}{y_B} = \overline{\hat{y}_B} $ endwhile $ 2 \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ( ) $		
$ \frac{2}{y_B} = \overline{\hat{y}_B} $ endwhile $ 2 \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ( ) $		$\left(y_T\right)  \left(A_{TL}x_T + \widehat{y}_T\right)$
endwhile $2  \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \hat{y}_T}{\hat{y}_B}\right) \land \neg ($	2	
$2 \qquad \left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \land \neg ($		
	2	
	1b	$y = Ax + \hat{y}$

Step	Algorithm: $[y] := \text{Symv_Lunb_var1}(A, x, y)$
1a	$y=\widehat{y}$
4	
	where
2	$\left(rac{y_T}{y_B} ight) = \left(rac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B} ight)$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge m(A_{TL}) < m(A)$
5a	
	where
6	
8	
5b	
7	
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
	endwhile
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge \neg (m(A_{TL}) < m(A))$
1b	$y = Ax + \hat{y}$

Step	Algorithm: $[y] := SYMV_LUNB_VAR1(A, x, y)$
1a	$y=\widehat{y}$
4	$A \to \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix}, x \to \begin{pmatrix} x_T \\ x_B \end{pmatrix}, y \to \begin{pmatrix} y_T \\ y_B \end{pmatrix}$ where $A_{TL}$ is $0 \times 0$ , $x_T$ has 0 rows, $y_T$ has 0 rows
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge m(A_{TL}) < m(A)$
5a	where
	where
6	
8	
5b	
7	
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
	endwhile
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \land \neg (m(A_{TL}) < m(A))$
1b	$y = Ax + \widehat{y}$

Step	Algorithm: $[y] := SYMV_L_UNB_VAR1(A, x, y)$
1a	$y = \widehat{y}$
4	$A \to \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix}, x \to \begin{pmatrix} x_T \\ x_B \end{pmatrix}, y \to \begin{pmatrix} y_T \\ y_B \end{pmatrix}$ where $A_{TL}$ is $0 \times 0$ , $x_T$ has 0 rows, $y_T$ has 0 rows
2	$\left( rac{y_T}{y_B}  ight) = \left( rac{A_{TL} x_T + \widehat{y}_T}{\widehat{y}_B}  ight)$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge m(A_{TL}) < m(A)$
5a	$ \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix} \rightarrow \begin{pmatrix} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ A_{20} & a_{21} & A_{22} \end{pmatrix}, \begin{pmatrix} x_T \\ x_B \end{pmatrix} \rightarrow \begin{pmatrix} x_0 \\ \chi_1 \\ x_2 \end{pmatrix}, \begin{pmatrix} y_T \\ y_B \end{pmatrix} \rightarrow \begin{pmatrix} y_0 \\ \hline \psi_1 \\ y_2 \end{pmatrix} $ where $\alpha_{11}$ is $1 \times 1$ , $\chi_1$ has 1 row, $\psi_1$ has 1 row
	where $\alpha_{11}$ is $1 \times 1$ , $\chi_1$ has 1 low, $\psi_1$ has 1 low
6	
8	
5b	$ \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BR} \end{vmatrix} \leftarrow \left(\frac{A_{00}}{a_{01}} \begin{vmatrix} a_{01} \\ a_{10} \end{vmatrix} \begin{vmatrix} A_{02} \\ a_{11} \end{vmatrix} \right), \left(\frac{x_T}{x_B}\right) \leftarrow \left(\frac{x_0}{\chi_1} \\ x_2\right), \left(\frac{y_T}{y_B}\right) \leftarrow \left(\frac{y_0}{\psi_1} \\ y_2\right) $
7	
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
	endwhile
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge \neg (m(A_{TL}) < m(A))$
1b	$y = Ax + \widehat{y}$

Step	Algorithm: $[y] := SYMV_L_UNB_VAR1(A, x, y)$
1a	$y = \widehat{y}$
4	$A \to \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix}, x \to \begin{pmatrix} x_T \\ x_B \end{pmatrix}, y \to \begin{pmatrix} y_T \\ y_B \end{pmatrix}$ where $A_{TL}$ is $0 \times 0$ , $x_T$ has 0 rows, $y_T$ has 0 rows
2	$\left(rac{y_T}{y_B} ight) = \left(rac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B} ight)$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge m(A_{TL}) < m(A)$
5a	$ \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BL} \end{vmatrix} A_{BR}\right) \to \left(\frac{A_{00}}{a_{01}} \begin{vmatrix} a_{01} \\ a_{10} \end{vmatrix} a_{11} \begin{vmatrix} a_{12} \\ a_{20} \end{vmatrix} \right), \left(\frac{x_T}{x_B}\right) \to \left(\frac{x_0}{\chi_1} \\ x_2\right), \left(\frac{y_T}{y_B}\right) \to \left(\frac{y_0}{\psi_1} \\ y_2\right) $
6	where $\alpha_{11}$ is $1 \times 1$ , $\chi_1$ has 1 row, $\psi_1$ has 1 row $ \begin{pmatrix} \underline{y_0} \\ \underline{\psi_1} \\ \underline{y_2} \end{pmatrix} = \begin{pmatrix} \underline{A_{00}x_0 + \widehat{y_0}} \\ \underline{\widehat{\psi_1}} \\ \underline{\widehat{y_2}} \end{pmatrix} $
8	
5b	$ \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BR} \end{vmatrix} \leftarrow \left(\frac{A_{00}}{a_{01}} \begin{vmatrix} a_{01} \\ a_{10} \end{vmatrix} \begin{vmatrix} A_{02} \\ a_{11} \end{vmatrix} \right), \left(\frac{x_T}{x_B}\right) \leftarrow \left(\frac{x_0}{\chi_1} \\ x_2\right), \left(\frac{y_T}{y_B}\right) \leftarrow \left(\frac{y_0}{\psi_1} \\ y_2\right) $
7	
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
	endwhile
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge \neg (m(A_{TL}) < m(A))$
1b	$y = Ax + \widehat{y}$

Step	Algorithm: $[y] := SYMV_L_UNB_VAR1(A, x, y)$
1a	$y = \widehat{y}$
4	$A \to \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix}, x \to \begin{pmatrix} x_T \\ x_B \end{pmatrix}, y \to \begin{pmatrix} y_T \\ y_B \end{pmatrix}$ where $A_{TL}$ is $0 \times 0$ , $x_T$ has 0 rows, $y_T$ has 0 rows
2	$\left(rac{y_T}{y_B} ight) = \left(rac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B} ight)$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge m(A_{TL}) < m(A)$
5a	$ \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BR} \end{vmatrix} \to \left(\frac{A_{00}}{a_{01}} \begin{vmatrix} a_{01} \\ a_{11} \\ A_{21} \end{vmatrix} a_{12} \\ A_{22} \end{vmatrix}, \left(\frac{x_T}{x_B}\right) \to \left(\frac{x_0}{\chi_1} \\ \frac{\chi_1}{x_2}\right), \left(\frac{y_T}{y_B}\right) \to \left(\frac{y_0}{\psi_1} \\ \frac{\psi_1}{y_2}\right) $
6	where $\alpha_{11}$ is $1 \times 1$ , $\chi_1$ has 1 row, $\psi_1$ has 1 row $ \begin{pmatrix} \underline{y_0} \\ \underline{\psi_1} \\ \underline{y_2} \end{pmatrix} = \begin{pmatrix} \underline{A_{00}x_0 + \widehat{y_0}} \\ \underline{\widehat{\psi_1}} \\ \underline{\widehat{y_2}} \end{pmatrix} $
8	
5b	$ \left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{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), \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right) $
7	$ \left(\frac{y_0}{\psi_1}\right) = \left(\frac{A_{00}x_0 + (a_{10}^T)^T \chi_1 + \widehat{y}_0}{a_{10}^T x_0 + \alpha_{11}\chi_1 + \widehat{\psi}_1}\right) \\ \frac{\widehat{y}_2}{\widehat{y}_2} $
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
	endwhile
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge \neg (m(A_{TL}) < m(A))$
1b	$y = Ax + \widehat{y}$

Step	Algorithm: $[y] := SYMV_L_UNB_VAR1(A, x, y)$
1a	$y = \widehat{y}$
4	$A \to \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix}, x \to \begin{pmatrix} x_T \\ x_B \end{pmatrix}, y \to \begin{pmatrix} y_T \\ y_B \end{pmatrix}$ where $A_{TL}$ is $0 \times 0$ , $x_T$ has 0 rows, $y_T$ has 0 rows
2	$ \left( \frac{y_T}{y_B} \right) = \left( \frac{A_{TL} x_T + \widehat{y}_T}{\widehat{y}_B} \right) $
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge m(A_{TL}) < m(A)$
5a	$ \left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \to \left(\begin{array}{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) \to \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \to \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right) $
6	where $\alpha_{11}$ is $1 \times 1$ , $\chi_1$ has 1 row, $\psi_1$ has 1 row $ \begin{pmatrix} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{pmatrix} = \begin{pmatrix} A_{00}x_0 + \widehat{y}_0 \\ \hline \widehat{\psi}_1 \\ \hline \widehat{y}_2 \end{pmatrix} $
8	$y_0 := (a_{10}^T)^T \chi_1 + y_0$ $\psi_1 := a_{10}^T x_0 + \alpha_{11} \chi_1 + \psi_1$
5b	$ \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BR} \end{vmatrix} \leftarrow \left(\frac{A_{00}}{a_{01}} \begin{vmatrix} a_{01} \\ a_{10} \end{vmatrix} \begin{vmatrix} A_{02} \\ a_{11} \end{vmatrix} \begin{vmatrix} a_{12} \\ A_{22} \end{vmatrix}, \left(\frac{x_T}{x_B}\right) \leftarrow \left(\frac{x_0}{\chi_1} \\ x_2 \end{vmatrix}, \left(\frac{y_T}{y_B}\right) \leftarrow \left(\frac{y_0}{\psi_1} \\ y_2 \end{vmatrix}\right) $
7	$ \left(\frac{y_0}{\psi_1}\right) = \left(\frac{A_{00}x_0 + (a_{10}^T)^T \chi_1 + \widehat{y}_0}{a_{10}^T x_0 + \alpha_{11}\chi_1 + \widehat{\psi}_1}\right) \\ \frac{\widehat{y}_2}{\widehat{y}_2} $
2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right)$
	endwhile
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{A_{TL}x_T + \widehat{y}_T}{\widehat{y}_B}\right) \wedge \neg (m(A_{TL}) < m(A))$
1b	$y = Ax + \widehat{y}$

Step	Algorithm: $[y] := SYMV_L_UNB_VAR1(A, x, y)$
	$A \to \begin{pmatrix} A_{TL} & A_{TR} \\ A_{BL} & A_{BR} \end{pmatrix}, x \to \begin{pmatrix} x_T \\ x_B \end{pmatrix}, y \to \begin{pmatrix} y_T \\ y_B \end{pmatrix}$ where $A_{TL}$ is $0 \times 0$ , $x_T$ has 0 rows, $y_T$ has 0 rows
	while $m(A_{TL}) < m(A)$ do
	$ \left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{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 \\ x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \chi_1 \\ x_2 \end{array}\right), \left(\begin{array}{c} y_T \\ y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \psi_1 \\ y_2 \end{array}\right) $ where $\alpha_{11}$ is $1 \times 1$ , $\chi_1$ has 1 row, $\psi_1$ has 1 row
	$y_0 := (a_{10}^T)^T \chi_1 + y_0$ $\psi_1 := a_{10}^T x_0 + \alpha_{11} \chi_1 + \psi_1$
	$ \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BR} \end{vmatrix} \leftarrow \left(\frac{A_{00}}{a_{01}} \begin{vmatrix} a_{01} \\ a_{10} \end{vmatrix} \begin{vmatrix} A_{02} \\ a_{11} \end{vmatrix} \right), \left(\frac{x_T}{x_B}\right) \leftarrow \left(\frac{x_0}{\chi_1} \\ x_2\right), \left(\frac{y_T}{y_B}\right) \leftarrow \left(\frac{y_0}{\psi_1} \\ y_2\right) $
	endwhile

$$A \to \left(\frac{A_{TL}}{A_{BL}} \begin{vmatrix} A_{TR} \\ A_{BL} \end{vmatrix} \right), x \to \left(\frac{x_T}{x_B}\right), y \to \left(\frac{y_T}{y_B}\right)$$

where  $A_{TL}$  is  $0 \times 0$ ,  $x_T$  has 0 rows,  $y_T$  has 0 rows

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

$$\left(\frac{A_{TL} | A_{TR}}{A_{BL} | A_{BR}}\right) \to \left(\frac{A_{00} | a_{01} | A_{02}}{a_{10}^T | \alpha_{11} | a_{12}^T}, \left(\frac{x_T}{x_B}\right) \to \left(\frac{x_0}{\chi_1}\right), \left(\frac{y_T}{y_B}\right) \to \left(\frac{y_0}{\psi_1}\right)$$

where  $\alpha_{11}$  is  $1 \times 1$ ,  $\chi_1$  has 1 row,  $\psi_1$  has 1 row

$$y_0 := (a_{10}^T)^T \chi_1 + y_0$$

$$\psi_1 := a_{10}^T x_0 + \alpha_{11} \chi_1 + \psi_1$$

$$\left(\frac{A_{TL} | A_{TR}}{A_{BL} | A_{BR}}\right) \leftarrow \left(\frac{A_{00} | a_{01} | A_{02}}{a_{10}^T | a_{11} | a_{12}^T}, \left(\frac{x_T}{x_B}\right) \leftarrow \left(\frac{x_0}{x_1}\right), \left(\frac{y_T}{y_B}\right) \leftarrow \left(\frac{y_0}{y_1}\right) \leftarrow \left(\frac{y_0}{y_1}\right)$$

endwhile