Step	Algorithm: $[y] := \textsc{symv\_l\_unb\_var5}(A, x, y)$
1a	$y = \widehat{y}$
4	$A \rightarrow \left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right)$, $x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right)$, $y \rightarrow \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right)$ where A_{BR} is 0×0, x_B has 0 rows, y_B has 0 rows
2	$\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) = \left(\begin{array}{c} \widehat{y}_T \\ \hline \widehat{y}_B + A_{BR} x_B \end{array}\right)$
3	while $m(A_{BR}) < m(A)$ do
2,3	$\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) = \left(\begin{array}{c} \widehat{y}_T \\ \hline \widehat{y}_B + A_{BR} x_B \end{array}\right) \wedge m(A_{BR}) < m(A)$
5a	$\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c\|c\|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$ where α_{11} is 1×1, χ_1 has 1 row, ψ_1 has 1 row
6	$\left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right) = \left(\begin{array}{c} \widehat{y}_0 \\ \hline \widehat{\psi}_1 \\ \hline \widehat{y}_2 + A_{22} x_2 \end{array}\right)$
8	$\psi_1 := \psi_1 + a_{11}\chi_1 + a_{21}^T x_2$ $y_2 := y_2 + a_{21}\chi_1$
5b	$\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$
7	$\left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right) = \left(\begin{array}{c} \widehat{y}_0 \\ \hline \widehat{\psi}_1 + a_{11}\chi_1 + a_{21}^T x_2 \\ \hline \widehat{y}_2 + a_{21}\chi_1 + A_{22} x_2 \end{array}\right)$
2	$\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) = \left(\begin{array}{c} \widehat{y}_T \\ \hline \widehat{y}_B + A_{BR} x_B \end{array}\right)$
	endwhile
2,3	$\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) = \left(\begin{array}{c} \widehat{y}_T \\ \hline \widehat{y}_B + A_{BR} x_B \end{array}\right) \wedge \neg(m(A_{BR}) < m(A))$
1b	$[y] = \mathrm{symv\_l}(A, x, \widehat{y}) = Ax + \widehat{y}$

Algorithm: $[y] := \text{SYMV\_L\_UNB\_VAR5}(A, x, y)$

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

where A_{BR} is 0×0, x_B has 0 rows, y_B has 0 rows

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

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$$

where α_{11} is 1×1, χ_1 has 1 row, ψ_1 has 1 row

$\psi_1 := \psi_1 + a_{11}\chi_1 + a_{21}^T x_2 \;\; y_2 := y_2 + a_{21}\chi_1$

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$$

endwhile

Step	Algorithm: $[y] := \text{SYMV\_L\_UNB\_VAR5}(A, x, y)$
1a	$y = \widehat{y}$
4	where
2	
3	while do
2,3	$\wedge$
5a	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg($ $)$
1b	$[y] = \text{symv\_l}(A, x, \widehat{y}) = Ax + \widehat{y}$

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3	while do
2,3	$\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) = \left(\begin{array}{c} \widehat{y}_T \\ \hline \widehat{y}_B + A_{BR} x_B \end{array}\right) \wedge$
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1a	$y = \widehat{y}$
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2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{\widehat{y}_T}{\widehat{y}_B + A_{BR} x_B}\right)$
3	while $m(A_{BR}) < m(A)$ do
2,3	$\left(\frac{y_T}{y_B}\right) = \left(\frac{\widehat{y}_T}{\widehat{y}_B + A_{BR} x_B}\right) \wedge m(A_{BR}) < m(A)$
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2	$\left(\frac{y_T}{y_B}\right) = \left(\frac{\widehat{y}_T}{\widehat{y}_B + A_{BR} x_B}\right)$
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6	
8	
5b	$\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$
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5b	$\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$
7	$\left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right) = \left(\begin{array}{c} \widehat{y}_0 \\ \hline \widehat{\psi}_1 + a_{11}\chi_1 + a_{21}^T x_2 \\ \hline \widehat{y}_2 + a_{21}\chi_1 + A_{22} x_2 \end{array}\right)$
2	$\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) = \left(\begin{array}{c} \widehat{y}_T \\ \hline \widehat{y}_B + A_{BR} x_B \end{array}\right)$
	endwhile
2,3	$\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) = \left(\begin{array}{c} \widehat{y}_T \\ \hline \widehat{y}_B + A_{BR} x_B \end{array}\right) \wedge \neg(m(A_{BR}) < m(A))$
1b	$[y] = \text{symv\_l}(A, x, \widehat{y}) = Ax + \widehat{y}$

Step	Algorithm: $[y] := \text{SYMV\_L\_UNB\_VAR5}(A, x, y)$
	$A \rightarrow \left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right)$, $x \rightarrow \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right)$, $y \rightarrow \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right)$ where A_{BR} is 0×0, x_B has 0 rows, y_B has 0 rows
	while $m(A_{BR}) < m(A)$ do
	$\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c\|c\|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$ where α_{11} is 1×1, χ_1 has 1 row, ψ_1 has 1 row
	$\psi_1 := \psi_1 + a_{11}\chi_1 + a_{21}^T x_2$ $y_2 := y_2 + a_{21}\chi_1$
	$\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right)$, $\left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$
	endwhile

Algorithm: $[y] := \textsc{symv\_l\_unb\_var5}(A, x, y)$

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

where A_{BR} is 0×0, x_B has 0 rows, y_B has 0 rows

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

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right), \quad \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \rightarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \quad \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \rightarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$$

where α_{11} is 1×1, χ_1 has 1 row, ψ_1 has 1 row

$\psi_1 := \psi_1 + a_{11}\chi_1 + a_{21}^T x_2 \; y_2 := y_2 + a_{21}\chi_1$

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right), \quad \left(\begin{array}{c} x_T \\ \hline x_B \end{array}\right) \leftarrow \left(\begin{array}{c} x_0 \\ \hline \chi_1 \\ \hline x_2 \end{array}\right), \quad \left(\begin{array}{c} y_T \\ \hline y_B \end{array}\right) \leftarrow \left(\begin{array}{c} y_0 \\ \hline \psi_1 \\ \hline y_2 \end{array}\right)$$

endwhile