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

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \left(A_L \middle\vert A_R \right)$, $B \to \left(B_L \middle\vert B_R \right)$, $C \to \left(\begin{array}{c\vert c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$\left(\begin{array}{c\vert c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\vert c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c\vert c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\vert c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	$\left(A_L \middle\vert A_R \right) \to \left(A_0 \middle\vert a_1 \middle\vert A_2 \right)$, $\left(B_L \middle\vert B_R \right) \to \left(B_0 \middle\vert b_1 \middle\vert B_2 \right)$, $\left(\begin{array}{c\vert c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \to$ $\left(\begin{array}{c\vert c\vert c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$ where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
6	$\left(\begin{array}{c\vert c\vert c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c\vert c\vert c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right)$
8	$\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$ $c_{21} := A_2^T b1 + B_2^T a_1 + \widehat{c}_{21}$
5b	$\left(A_L \middle\vert A_R \right) \leftarrow \left(A_0 \middle\vert a_1 \middle\vert A_2 \right)$, $\left(B_L \middle\vert B_R \right) \leftarrow \left(B_0 \middle\vert b_1 \middle\vert B_2 \right)$, $\left(\begin{array}{c\vert c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow$ $\left(\begin{array}{c\vert c\vert c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$
7	$\left(\begin{array}{c\vert c\vert c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c\vert c\vert c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \widehat{c}_{10}^T & a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & A_2^T b_1 + B_2^T a_1 + \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right)$
2	$\left(\begin{array}{c\vert c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\vert c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left(\begin{array}{c\vert c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\vert c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$

$A \rightarrow \left(A_L \middle| A_R \right)$, $B \rightarrow \left(B_L \middle| B_R \right)$, $C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$

where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0

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

$\left(A_L \middle| A_R \right) \rightarrow \left(A_0 \middle| a_1 \middle| A_2 \right)$, $\left(B_L \middle| B_R \right) \rightarrow \left(B_0 \middle| b_1 \middle| B_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$

where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1

$\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$

$c_{21} := A_2^T b1 + B_2^T a_1 + \widehat{c}_{21}$

$\left(A_L \middle| A_R \right) \leftarrow \left(A_0 \middle| a_1 \middle| A_2 \right)$, $\left(B_L \middle| B_R \right) \leftarrow \left(B_0 \middle| b_1 \middle| B_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$

endwhile

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
1a	$C = \widehat{C}$
4	where
2	
3	while do
2,3	$\wedge$
5a	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg (\qquad)$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
1a	$C = \widehat{C}$
4	where
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
3	while do
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge$
5a	where
6	
8	
5b	
7	
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
	endwhile
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge \neg(\qquad\qquad)$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr2k\_lt\_unb\_var4}(A, B, C)$
1a	$C = \widehat{C}$
4	where
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge n(A_L) < n(A)$
5a	where
6	
8	
5b	
7	
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
	endwhile
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \rightarrow \left(A_L \middle| A_R \right) , B \rightarrow \left(B_L \middle| B_R \right) , C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	where
6	
8	
5b	
7	
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr2k\_lt\_unb\_var4}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \left(A_L \middle\| A_R \right)$, $B \to \left(B_L \middle\| B_R \right)$, $C \to \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	$\left(A_L \middle\| A_R \right) \to \left(A_0 \middle\| a_1 \middle\| A_2 \right)$, $\left(B_L \middle\| B_R \right) \to \left(B_0 \middle\| b_1 \middle\| B_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \to$ $\left(\begin{array}{c\|c\|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$ where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
6	
8	
5b	$\left(A_L \middle\| A_R \right) \leftarrow \left(A_0 \middle\| a_1 \middle\| A_2 \right)$, $\left(B_L \middle\| B_R \right) \leftarrow \left(B_0 \middle\| b_1 \middle\| B_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow$ $\left(\begin{array}{c\|c\|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$
7	
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \left(A_L \middle| A_R \right)$, $B \to \left(B_L \middle| B_R \right)$, $C \to \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where $\quad A_L$ has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	$\left(A_L \middle| A_R \right) \;\to\; \left(A_0 \middle| a_1 \middle| A_2 \right)$, $\left(B_L \middle| B_R \right) \;\to\; \left(B_0 \middle| b_1 \middle| B_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \;\to$ $\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$ where $\quad a_1$ has 1 column, b_1 has 1 column, γ_{11} is 1×1
6	$\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|c|c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right)$
8	
5b	$\left(A_L \middle| A_R \right) \;\leftarrow\; \left(A_0 \middle| a_1 \middle| A_2 \right)$, $\left(B_L \middle| B_R \right) \;\leftarrow\; \left(B_0 \middle| b_1 \middle| B_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \;\leftarrow$ $\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$
7	
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \rightarrow \left(A_L \middle| A_R \right), B \rightarrow \left(B_L \middle| B_R \right), C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	$\left(A_L \middle| A_R \right) \rightarrow \left(A_0 \middle| a_1 \middle| A_2 \right), \left(B_L \middle| B_R \right) \rightarrow \left(B_0 \middle| b_1 \middle| B_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow$ $\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$ where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
6	$\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|c|c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right)$
8	
5b	$\left(A_L \middle| A_R \right) \leftarrow \left(A_0 \middle| a_1 \middle| A_2 \right), \left(B_L \middle| B_R \right) \leftarrow \left(B_0 \middle| b_1 \middle| B_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow$ $\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$
7	$\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|c|c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \widehat{c}_{10}^T & a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & A_2^T b_1 + B_2^T a_1 + \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right)$
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \left(A_L \middle| A_R \right)$, $B \to \left(B_L \middle| B_R \right)$, $C \to \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	$\left(A_L \middle| A_R \right) \to \left(A_0 \middle| a_1 \middle| A_2 \right)$, $\left(B_L \middle| B_R \right) \to \left(B_0 \middle| b_1 \middle| B_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \to$ $\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$ where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
6	$\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|c|c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right)$
8	$\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$ $c_{21} := A_2^T b1 + B_2^T a_1 + \widehat{c}_{21}$
5b	$\left(A_L \middle| A_R \right) \leftarrow \left(A_0 \middle| a_1 \middle| A_2 \right)$, $\left(B_L \middle| B_R \right) \leftarrow \left(B_0 \middle| b_1 \middle| B_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow$ $\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$
7	$\left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|c|c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \widehat{c}_{10}^T & a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & A_2^T b_1 + B_2^T a_1 + \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right)$
2	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR2K\_LT\_UNB\_VAR4}(A, B, C)$
	$A \rightarrow \left(A_L \middle| A_R \right), B \rightarrow \left(B_L \middle| B_R \right), C \rightarrow \left(\dfrac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
	while $n(A_L) < n(A)$ do
	$\left(A_L \middle| A_R \right) \rightarrow \left(A_0 \middle| a_1 \middle| A_2 \right), \left(B_L \middle| B_R \right) \rightarrow \left(B_0 \middle| b_1 \middle| B_2 \right), \left(\dfrac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \rightarrow$ $\left(\dfrac{C_{00} \middle| c_{01} \middle| C_{02}}{c_{10}^T \middle| \gamma_{11} \middle| c_{12}^T \\ \hline C_{20} \middle| c_{21} \middle| C_{22}} \right)$ where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
	$\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$ $c_{21} := A_2^T b1 + B_2^T a_1 + \widehat{c}_{21}$
	$\left(A_L \middle| A_R \right) \leftarrow \left(A_0 \middle| a_1 \middle| A_2 \right), \left(B_L \middle| B_R \right) \leftarrow \left(B_0 \middle| b_1 \middle| B_2 \right), \left(\dfrac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \leftarrow$ $\left(\dfrac{C_{00} \middle| c_{01} \middle| C_{02}}{c_{10}^T \middle| \gamma_{11} \middle| c_{12}^T \\ \hline C_{20} \middle| c_{21} \middle| C_{22}} \right)$
	endwhile

Algorithm: $[C] := \textsc{Syr2k\_lt\_unb\_var4}(A, B, C)$

$A \rightarrow \left(A_L \middle| A_R \right), B \rightarrow \left(B_L \middle| B_R \right), C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$

$\quad$ **where** $\quad A_L$ has 0 columns, B_L has 0 columns, C_{TL} is 0×0

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

$$\left(A_L \middle| A_R \right) \rightarrow \left(A_0 \middle| a_1 \middle| A_2 \right), \left(B_L \middle| B_R \right) \rightarrow \left(B_0 \middle| b_1 \middle| B_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$$

$\quad$ **where** $\quad a_1$ has 1 column, b_1 has 1 column, γ_{11} is 1×1

$\quad \gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$

$\quad c_{21} := A_2^T b1 + B_2^T a_1 + \widehat{c}_{21}$

$$\left(A_L \middle| A_R \right) \leftarrow \left(A_0 \middle| a_1 \middle| A_2 \right), \left(B_L \middle| B_R \right) \leftarrow \left(B_0 \middle| b_1 \middle| B_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$$

endwhile