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: $[C] := Syr2k_lt_unb_var3(A, B, C)$
1a	$C = \hat{C}$
4	$A \to \left(A_L \middle A_R\right), B \to \left(B_L \middle B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle C_{BR}\right)$
	where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} \widehat{C}_{TR}}{B_R^T A_L + \widehat{C}_{BL} \widehat{C}_{BR}}\right) \wedge n(A_L) < n(A) $
5a	$\left(A_L \middle A_R\right) \rightarrow \left(A_0 \middle a_1 \middle A_2\right) , \left(B_L \middle B_R\right) \rightarrow \left(B_0 \middle b_1 \middle B_2\right) , \left(\frac{C_{TL} \middle C_{TR}}{C_{BL} \middle C_{BR}}\right) \rightarrow$
	$egin{pmatrix} C_{00} & c_{01} & C_{02} \ \hline c_{10}^T & \gamma_{11} & c_{12}^T \ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}$
	where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
6	$\begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline b_1^T A_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline B_2^T A_0 + \widehat{C}_{20} & \widehat{c}_{21} \widehat{C}_{22} \end{pmatrix}$
	$c_{10}^T := a_1^T B_0 + \widehat{c}_{10}^T$
8	$\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$
	$c_{21} := B_2^T a_1 + \widehat{c}_{21}$
5b	$\left(A_L \middle A_R\right) \leftarrow \left(A_0 \middle a_1 \middle A_2\right) , \left(B_L \middle B_R\right) \leftarrow \left(B_0 \middle b_1 \middle B_2\right) , \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow$
	$\int C_{00} c_{01} C_{02}$
	$oxed{c_{10}^T \gamma_{11} c_{12}^T}$
	$oxed{C_{20} c_{21} C_{22}}$
	$\left(\begin{array}{c c} C_{00} & c_{01} & C_{02} \end{array}\right) \left(\begin{array}{c c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \end{array}\right)$
7	$ \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline b_1^T A_0 + a_1^T B_0 + \widehat{c}_{10}^T & a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11} & 0 \\ \hline B_2^T A_0 + \widehat{C}_{20} & B_2^T a_1 + \widehat{c}_{21} & \widehat{C}_{22} \end{pmatrix} $
	$C_{20} c_{21} C_{22}$ $B_2^TA_0 + C_{20}$ $B_2^Ta_1 + \hat{c}_{21}$ C_{22}
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Algorithm: $[C] := Syr2k_Lt_Unb_Var3(A, B, C)$

$$A \to \left(A_L \middle| A_R\right), B \to \left(B_L \middle| B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle| C_{TR}\right)$$

where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0 while $n(A_L) < n(A)$ do

$$\left(A_{L} \middle| A_{R} \right) \to \left(A_{0} \middle| a_{1} \middle| A_{2} \right) , \left(B_{L} \middle| B_{R} \right) \to \left(B_{0} \middle| b_{1} \middle| B_{2} \right) , \left(\frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \to \left(\frac{C_{00} \middle| c_{01} \middle| C_{02}}{\frac{c_{10}^{T} \middle| c_{12}^{T}}{C_{20} \middle| c_{21} \middle| C_{22}}} \right)$$

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

$$c_{10}^T := a_1^T B_0 + \hat{c}_{10}^T$$

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

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

$$\left(A_{L} \middle| A_{R} \right) \leftarrow \left(A_{0} \middle| a_{1} \middle| A_{2} \right) , \left(B_{L} \middle| B_{R} \right) \leftarrow \left(B_{0} \middle| b_{1} \middle| B_{2} \right) , \left(\frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \leftarrow \left(\frac{C_{00} \middle| c_{01} \middle| C_{02}}{c_{10}^{T} \middle| \gamma_{11} \middle| c_{12}^{T}} \right)$$

endwhile

Step	Algorithm: $[C] := Syr2k_Ltt_unb_var3(A, B, C)$
1a	$C = \hat{C}$
4	where
2	
3	while do
2,3	\wedge
5a	
	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg ($
1b	$[C] = \operatorname{Syr}2k_{-}\operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_ltt_unb_var}3(A, B, C)$
1a	$C = \widehat{C}$
4	
	where
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL} \hat{C}_{TR}}{B_R^T A_L + \hat{C}_{BL} \hat{C}_{BR}}\right) $
3	while do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge $
5a	
	where
6	
8	
5b	
7	
·	
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg () $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_ltt_unb_var}3(A, B, C)$
1a	$C = \widehat{C}$
4	
2	where $ \left(\frac{C_{TL} \mid C_{TR}}{C_{BL} \mid C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL} \mid \hat{C}_{TR}}{B_R^T A_L + \hat{C}_{BL} \mid \hat{C}_{BR}}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	
	where
6	
8	
5b	
7	
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \wedge \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k_{-}\operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_Ltt_unb_var}3(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \begin{pmatrix} A_L A_R \end{pmatrix}$, $B \to \begin{pmatrix} B_L B_R \end{pmatrix}$, $C \to \begin{pmatrix} C_{TL} C_{TR} \\ C_{BL} C_{BR} \end{pmatrix}$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \wedge n(A_L) < n(A) $
5a	
	where
6	
8	
5b	
7	
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

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

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

Step	Algorithm: $[C] := Syr2k_lt_unb_var3(A, B, C)$
1a	$C = \hat{C}$
4	$A \to \left(A_L \middle A_R\right), B \to \left(B_L \middle B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle C_{BR}\right)$
	where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0 $\begin{pmatrix} C_{TL} & C_{TR} \end{pmatrix} = \begin{pmatrix} A_L^T B_L + B_L^T A_L + \hat{C}_{TL} & \hat{C}_{TR} \end{pmatrix}$
2	$\begin{pmatrix} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{pmatrix} = \begin{pmatrix} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{pmatrix}$
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	$\left(A_L \middle A_R\right) \rightarrow \left(A_0 \middle a_1 \middle A_2\right) , \left(B_L \middle B_R\right) \rightarrow \left(B_0 \middle b_1 \middle B_2\right) , \left(\frac{C_{TL} \middle C_{TR}}{C_{BL} \middle C_{BR}}\right) \rightarrow$
	$\begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline c_{10} & c_{10} & c_{10} \end{pmatrix}$
	$\overline{C_{20}} c_{21} C_{22}$ where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
	$\begin{pmatrix} C_{00} & C_{01} & C_{02} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \end{pmatrix}$
6	$ \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \hat{C}_{00} & 0 & 0 \\ \hline b_1^T A_0 + \hat{c}_{10}^T & \hat{\gamma}_{11} & 0 \\ \hline B_2^T A_0 + \hat{C}_{20} & \hat{c}_{21} & \hat{C}_{22} \end{pmatrix} $
	$C_{20} c_{21} C_{22} $ $B_2^T A_0 + C_{20} c_{21} C_{22}$
8	
5b	$\left(A_L \middle A_R\right) \leftarrow \left(A_0 \middle a_1 \middle A_2\right) , \left(B_L \middle B_R\right) \leftarrow \left(B_0 \middle b_1 \middle B_2\right) , \left(\frac{C_{TL} \middle C_{TR}}{C_{BL} \middle C_{BR}}\right) \leftarrow$
	$\left(C_{00} c_{01} C_{02} \right)$
	$oxed{c_{10}^T \gamma_{11} \ c_{12}^T}$
	$igg C_{20} ig C_{21} ig C_{22} igg $
7	$\begin{pmatrix} C_{00} c_{01} C_{02} \\ cT cT cT \\ cT cT $
	$ \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \hat{C}_{00} & 0 & 0 \\ b_1^T A_0 + a_1^T B_0 + \hat{c}_{10}^T & a_1^T b_1 + b_1^T a_1 + \hat{\gamma}_{11} & 0 \\ B_2^T A_0 + \hat{C}_{20} & B_2^T a_1 + \hat{c}_{21} & \hat{C}_{22} \end{pmatrix} $
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} \widehat{C}_{TR}}{B_R^T A_L + \widehat{C}_{BL} \widehat{C}_{BR}}\right) $
	endwhile
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := Syr2k_Ltt_unb_var3(A, B, C)$
1a	$C = \hat{C}$
4	$A \to \left(A_L \middle A_R\right), B \to \left(B_L \middle B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle C_{BR}\right)$
2	where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0 $ \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 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(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	$\left(A_L \middle A_R\right) \rightarrow \left(A_0 \middle a_1 \middle A_2\right) , \left(B_L \middle B_R\right) \rightarrow \left(B_0 \middle b_1 \middle B_2\right) , \left(\frac{C_{TL} \middle C_{TR}}{C_{BL} \middle C_{BR}}\right) \rightarrow$
	$ \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix} $ where a_1 has 1 column, b_1 has 1 column, γ_{11} is 1×1
6	$ \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \hat{C}_{00} & 0 & 0 \\ \hline b_1^T A_0 + \hat{c}_{10}^T & \hat{\gamma}_{11} & 0 \\ \hline B_2^T A_0 + \hat{C}_{20} & \hat{c}_{21} & \hat{C}_{22} \end{pmatrix} $
8	$c_{10}^T := a_1^T B_0 + \widehat{c}_{10}^T$ $\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$ $c_{21} := B_2^T a_1 + \widehat{c}_{21}$
5b	$\left(A_L \middle A_R\right) \leftarrow \left(A_0 \middle a_1 \middle A_2\right) , \left(B_L \middle B_R\right) \leftarrow \left(B_0 \middle b_1 \middle B_2\right) , \left(\frac{C_{TL} \middle C_{TR}}{C_{BL} \middle C_{BR}}\right) \leftarrow$
	$egin{pmatrix} C_{00} & c_{01} & C_{02} \ \hline c_{10}^T & \gamma_{11} & c_{12}^T \ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}$
7	$ \frac{C_{00} c_{01} C_{02}}{c_{10}^{T} \gamma_{11} c_{12}^{T}} = \frac{A_{0}^{T} B_{0} + B_{0}^{T} A_{0} + \hat{C}_{00} 0}{b_{1}^{T} A_{0} + a_{1}^{T} B_{0} + \hat{c}_{10}^{T} a_{1}^{T} b_{1} + b_{1}^{T} a_{1} + \hat{\gamma}_{11} 0} = \frac{A_{0}^{T} B_{0} + B_{0}^{T} A_{0} + \hat{C}_{10}^{T} a_{1}^{T} b_{1} + b_{1}^{T} a_{1} + \hat{\gamma}_{11} 0}{B_{2}^{T} A_{0} + \hat{C}_{20} B_{2}^{T} a_{1} + \hat{c}_{21} \hat{C}_{22}} $
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 B_R^T A_L + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr2k_lt_unb_var3}(A, B, C)$
	$A \to \begin{pmatrix} A_L A_R \end{pmatrix}$, $B \to \begin{pmatrix} B_L B_R \end{pmatrix}$, $C \to \begin{pmatrix} C_{TL} C_{TR} \\ C_{BL} C_{BR} \end{pmatrix}$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
	where TL has a columns, DL has a columns, CTL is a \times a
	while $n(A_L) < n(A)$ do
	$ \begin{pmatrix} A_{L} A_{R} \end{pmatrix} \rightarrow \begin{pmatrix} A_{0} a_{1} A_{2} \end{pmatrix}, \begin{pmatrix} B_{L} B_{R} \end{pmatrix} \rightarrow \begin{pmatrix} B_{0} b_{1} B_{2} \end{pmatrix}, \begin{pmatrix} C_{TL} C_{TR} \\ C_{BL} C_{BR} \end{pmatrix} \rightarrow \begin{pmatrix} C_{00} c_{01} C_{02} \\ \hline{c_{10}^{T} \gamma_{11} c_{12}^{T}} \\ \hline{C_{20} c_{21} C_{22}} \end{pmatrix} $ where a_{1} has 1 column, b_{1} has 1 column, γ_{11} is 1×1
	$c_{10}^T := a_1^T B_0 + \widehat{c}_{10}^T$ $\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$ $c_{21} := B_2^T a_1 + \widehat{c}_{21}$
	$ \begin{pmatrix} A_{L} A_{R} \end{pmatrix} \leftarrow \begin{pmatrix} A_{0} a_{1} A_{2} \end{pmatrix}, \begin{pmatrix} B_{L} B_{R} \end{pmatrix} \leftarrow \begin{pmatrix} B_{0} b_{1} B_{2} \end{pmatrix}, \begin{pmatrix} C_{TL} C_{TR} \\ C_{BL} C_{BR} \end{pmatrix} \leftarrow \begin{pmatrix} C_{00} c_{01} C_{02} \\ C_{10} c_{11} c_{12}^{T} \\ C_{20} c_{21} C_{22} \end{pmatrix} $
	endwhile

Algorithm: $[C] := Syr2k_Lt_Unb_Var3(A, B, C)$

$$A \to \left(A_L \middle| A_R\right), B \to \left(B_L \middle| B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle| C_{TR}\right)$$

where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0 while $n(A_L) < n(A)$ do

$$\left(A_{L} \middle| A_{R} \right) \to \left(A_{0} \middle| a_{1} \middle| A_{2} \right) , \left(B_{L} \middle| B_{R} \right) \to \left(B_{0} \middle| b_{1} \middle| B_{2} \right) , \left(\frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \to \left(\frac{C_{00} \middle| c_{01} \middle| C_{02}}{\frac{c_{10}^{T} \middle| c_{12}^{T}}{C_{20} \middle| c_{21} \middle| C_{22}}} \right)$$

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

$$c_{10}^T := a_1^T B_0 + \hat{c}_{10}^T$$

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

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

$$\left(A_{L} \middle| A_{R} \right) \leftarrow \left(A_{0} \middle| a_{1} \middle| A_{2} \right) , \left(B_{L} \middle| B_{R} \right) \leftarrow \left(B_{0} \middle| b_{1} \middle| B_{2} \right) , \left(\frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \leftarrow \left(\frac{C_{00} \middle| c_{01} \middle| C_{02}}{c_{10}^{T} \middle| \gamma_{11} \middle| c_{12}^{T}} \right)$$

endwhile