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: $[C] := \text{Syr}2\text{K_Ltt\_unb\_var}3(A, B, C)$
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 $0 \times 0$
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}}{A_R^T B_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}}{A_R^T B_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	$\left(A_L \middle  A_R\right) \rightarrow \left(A_0 \middle  a_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \rightarrow \left(B_0 \middle  b_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \rightarrow$
	$ \left( \begin{array}{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, $\gamma_{11}$ is $1 \times 1$
6	$\begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + \widehat{C}_{20} & \widehat{c}_{21}  \widehat{C}_{22} \end{pmatrix}$
	$c_{10}^T := b_1^T A_0 + \widehat{c}_{10}^T$
8	$\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$
	$c_{21} := A_2^T b_1 + \widehat{c}_{21}$
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  a_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  b_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \leftarrow$
	$\int C_{00}  c_{01}  C_{02}$
	$oxed{c_{10}^T \gamma_{11} c_{12}^T}$
	$\left\langle \overline{C_{20}}   c_{21}   \overline{C_{22}} \right angle$
	$\left(\begin{array}{c c} C_{00} & c_{01} & C_{02} \end{array}\right)  \left(\begin{array}{c c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \end{array}\right)$
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 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 + \widehat{C}_{20} & A_2^T b_1 + \widehat{c}_{21} & \widehat{C}_{22} \end{pmatrix} $
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}}{A_R^T B_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}}{A_R^T B_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:  $[C] := Syr2k_Lt_Unb_Var3(A, B, C)$ 

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

where  $A_L$  has 0 columns,  $B_L$  has 0 columns,  $C_{TL}$  is  $0 \times 0$  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,  $\gamma_{11}$  is  $1 \times 1$ 

$$c_{10}^T := b_1^T A_0 + \hat{c}_{10}^T$$

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

$$c_{21} := A_2^T b_1 + \widehat{c}_{21}$$

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

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}}{A_R^T B_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}}{A_R^T B_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}}{A_R^T B_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 + \hat{C}_{TL}}{A_R^T B_L + \hat{C}_{BL}} \begin{vmatrix} \hat{C}_{TR} \\ \hat{C}_{BR} \end{vmatrix} \right) \land \neg ( )  $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr2k\_lt\_unb\_var3}(A, B, C)$
1a	$C = \widehat{C}$
4	
	1
	where $\begin{pmatrix} C_{TL} & C_{TR} \end{pmatrix} = \begin{pmatrix} A_{TL}^T B_L + B_{TL}^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \end{pmatrix}$
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}}{A_R^T B_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}} \frac{C_{TR}}{C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + \widehat{C}_{BL}}   \widehat{C}_{TR} \right) \wedge n(A_L) < n(A) $
5a	
	where
	WHELE
6	
8	
5b	
7	
2	$\left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right)$
	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}}{A_R^T B_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	$A \to \begin{pmatrix} A_L   A_R \end{pmatrix}$ , $B \to \begin{pmatrix} B_L   B_R \end{pmatrix}$ , $C \to \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix}$ where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
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}}{A_R^T B_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}}{A_R^T B_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}}{A_R^T B_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}}{A_R^T B_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr2k\_lt}(A, B, \widehat{C})$

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 $0 \times 0$ $ \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} \\ A_R^T B_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} \\ A_R^T B_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, $\gamma_{11}$ is $1 \times 1$
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_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}  \widehat{C}_{TR}}{A_R^T B_L + \widehat{C}_{BL}  \widehat{C}_{BR}}\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}}{A_R^T B_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	$A  o \left(A_L \middle  A_R\right) , B  o \left(B_L \middle  B_R\right) , C  o \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right)$
	where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
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}}{A_R^T B_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}}{A_R^T B_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{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, $\gamma_{11}$ is $1 \times 1$
6	$\begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + \widehat{C}_{20} & \widehat{c}_{21}  \widehat{C}_{22} \end{pmatrix}$
8	
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  a_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  b_1 \middle  B_2\right) , \left(\frac{C_{TL}}{C_{BL}} \middle  C_{BR}\right) \leftarrow$
	$egin{pmatrix} C_{00} & c_{01} & C_{02} \ \hline c_{10}^T & \gamma_{11} & c_{12}^T \ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}$
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}}{A_R^T B_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}}{A_R^T B_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 $0 \times 0$
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}}{A_R^T B_L + \widehat{C}_{BL}  \widehat{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}}{A_R^T B_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \wedge n(A_L) < n(A) $
5a	$\left(A_L \middle  A_R\right) \rightarrow \left(A_0 \middle  a_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \rightarrow \left(B_0 \middle  b_1 \middle  B_2\right) , \left(\frac{C_{TL}}{C_{BL}} \middle  C_{BR}\right) \rightarrow$
	$egin{pmatrix} C_{00} & c_{01} & C_{02} \ \hline c_{10}^T & \gamma_{11} & c_{12}^T \ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}$
	where $a_1$ has 1 column, $b_1$ has 1 column, $\gamma_{11}$ is $1 \times 1$
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 a_1^T B_0 + \hat{c}_{10}^T & \hat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + \hat{C}_{20} & \hat{c}_{21} & \hat{C}_{22} \end{pmatrix} $
8	
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  a_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  b_1 \middle  B_2\right) , \left(\frac{C_{TL}}{C_{BL}} \middle  C_{BR}\right) \leftarrow$
	$\int C_{00}  c_{01}  C_{02}$
	$oxed{c_{10}^T \gamma_{11} c_{12}^T}$
	$oxed{C_{20} c_{21} C_{22}}$
	$\left( \frac{C_{00}}{C_{01}} \left  \frac{C_{02}}{C_{01}} \right  \right) \left( \frac{A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00}}{C_{01}} \right) = 0$
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 + \hat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + b_1^T A_0 + \hat{c}_{10}^T & a_1^T b_1 + b_1^T a_1 + \hat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + \hat{C}_{20} & A_2^T b_1 + \hat{c}_{21} & \hat{C}_{22} \end{pmatrix} $
	$\begin{pmatrix} C_{20} c_{21} C_{22} \end{pmatrix} \begin{pmatrix} A_2^TB_0 + C_{20} & A_2^Tb_1 + c_{21} & C_{22} \end{pmatrix}$
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}}{A_R^T B_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}}{A_R^T B_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 $0 \times 0$ $ \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 A_R^T B_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_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}  \widehat{C}_{TR}}{A_R^T B_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, $\gamma_{11}$ is $1 \times 1$
6	$\begin{pmatrix} C_{00} & c_{01} & C_{02} \\ \hline c_{10}^T & \gamma_{11} & c_{12}^T \\ \hline C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline a_1^T B_0 + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & 0 \\ \hline A_2^T B_0 + \widehat{C}_{20} & \widehat{c}_{21}  \widehat{C}_{22} \end{pmatrix}$
	$c_{10}^T := b_1^T A_0 + \hat{c}_{10}^T$
8	$\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$
	$c_{21} := A_2^T b_1 + \widehat{c}_{21}$
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  a_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  b_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \leftarrow$
	$\int C_{00}  c_{01}  C_{02}$
	$oxed{ c_{10}^T egin{array}{c c} \gamma_{11} & c_{12}^T \ \hline \end{array} }$
	$igg C_{20} c_{21} c_{22}$
	$\left(\begin{array}{c c} C_{00} & c_{01} & C_{02} \end{array}\right)  \left(\begin{array}{c c} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \end{array}\right)$
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 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 + \widehat{C}_{20} & A_2^T b_1 + \widehat{c}_{21} & \widehat{C}_{22} \end{pmatrix} $
2	$ \left(\frac{C_{TL} \left  C_{TR} \right }{C_{BL} \left  C_{BR} \right } \right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} \left  \widehat{C}_{TR} \right }{A_R^T B_L + \widehat{C}_{BL} \left  \widehat{C}_{BR} \right }\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}}{A_R^T B_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr2k.lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_Ltt_unb_var}3(A, B, C)$
	$A \to \left(A_L \middle  A_R\right), B \to \left(B_L \middle  B_R\right), C \to \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right)$
	where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
	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} \end{pmatrix} $
	$ \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, $\gamma_{11}$ is $1 \times 1$
	$c_{10}^T := b_1^T A_0 + \widehat{c}_{10}^T$ $\gamma_{11} := a_1^T b_1 + b_1^T a_1 + \widehat{\gamma}_{11}$ $c_{21} := A_2^T b_1 + \widehat{c}_{21}$
	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  a_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  b_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \leftarrow$
	$egin{pmatrix} rac{C_{00}}{c_{01}} & c_{01} & C_{02} \ \hline c_{10}^T & \gamma_{11} & c_{12}^T \ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}$
	endwhile

Algorithm:  $[C] := \text{Syr}2\text{K_LT_UNB_VAR}3(A, B, C)$ 

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

where  $A_L$  has 0 columns,  $B_L$  has 0 columns,  $C_{TL}$  is  $0 \times 0$  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,  $\gamma_{11}$  is  $1 \times 1$ 

$$c_{10}^T := b_1^T A_0 + \hat{c}_{10}^T$$

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

$$c_{21} := A_2^T b_1 + \widehat{c}_{21}$$

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

endwhile