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: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	$A  o \left(\frac{A_T}{A_B}\right), B  o \left(\frac{B_T}{B_B}\right), C  o \left(\frac{C_{TL} C_{TR} }{C_{BL} C_{BR}}\right)$ where $A_T$ has 0 rows, $B_T$ has 0 rows, $C_{TL}$ is $0  imes 0$
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix}\right) $
3	while $m(A_T) < m(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge m(A_T) < m(A) $
5a	$ \left(\frac{A_T}{A_B}\right) \to \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \to \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \to \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}^T   \gamma_{11}   c_{12}^T}\right) \\ \frac{C_{00}   c_{01}   C_{02}}{C_{20}   c_{21}   C_{22}} $
6	where $a_1$ has 1 row, $b_1$ has 1 row, $\gamma_{11}$ is $1 \times 1$ $ \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 B_0^T + B_0 A_0^T + \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{c}_{10}^T & \widehat{\gamma}_{11} & \widehat{c}_{12}^T \\ \hline \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{pmatrix} $
8	update line 1 : update line n
5b	$ \left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}^T   \gamma_{11}   c_{12}^T}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}   c_{12}}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}   c_{12}}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}   c_{12}}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}   c_{12}}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{TL}   C_{TR}}{c_{10}   c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   c_{11}   c_{12}}\right) \leftarrow \left(\frac{C_{TL}   C_{TR}}{c_{10}   c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{TL}   c_{11}   c_{12}}\right) \leftarrow \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{12}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{11}   c_{12}}{c_{11}   c_{11}}\right) + \left(\frac{C_{TL}   c_{11}   c_{12}}{c_{11}   c_{11}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{11}   c_{11}}{c_{11}   c_{11}}\right) + \left(\frac{C_{TL}   c_{11}   c_{11}}{c_{11}}\right) \\ \left(\frac{C_{TL}   c_{11}   c_{11}}{c_{11}}\right) + \left(\frac$
7	$egin{pmatrix} C_{00} & c_{01} & C_{02} \ \hline c_{10}^T & \gamma_{11} & c_{12}^T \ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}$
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\hat{C}_{TL} + A_T B_T^T + B_T A_T^T \hat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\hat{C}_{BL}}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T   \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) \wedge \neg (m(A_T) < m(A)) $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Algorithm:  $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$ 

$$A \to \left(\frac{A_T}{A_B}\right) , B \to \left(\frac{B_T}{B_B}\right) , C \to \left(\frac{C_{TL}}{C_{BL}}\right)$$

where  $A_T$  has 0 rows,  $B_T$  has 0 rows,  $C_{TL}$  is  $0 \times 0$ 

while  $m(A_T) < m(A)$  do

$$\left(\frac{A_T}{A_B}\right) \to \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \to \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \to \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right)$$

where  $a_1$  has 1 row,  $b_1$  has 1 row,  $\gamma_{11}$  is  $1 \times 1$ 

update line 1

:

update line n

$$\left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right) \\
\left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right) \\
\left(\frac{C_{00} c_{01} C_{02}}{C_{20} c_{21} C_{22}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10} c_{12} c_{22}}\right) \\
\left(\frac{C_{00} c_{01} c_{02}}{C_{02} c_{21} c_{22}}\right) = C_{00} c_{01} c_{02} c$$

endwhile

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	
4	
	where
2	
3	while do
0.0	
2,3	$\land$
5a	
	where
C	
6	
8	
O	
5b	
7	
2	
2	
	endwhile
2,3	$\wedge \neg ($
۷,5	
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	
	where
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix}\right) $
3	while do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge  $
5a	
	where
C	
6	
8	
-1	
5b	
7	
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) $
	endwhile
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg ( )  $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	
_	
	where $\begin{pmatrix} C_{nn} & C_{nn} & A_{nn}B^T + B_{nn}A^T & C_{nn} + A_{nn}B^T + B_{nn}A^T \end{pmatrix}$
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) $
3	while $m(A_T) < m(A)$ do
2,3	$ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c c} \widehat{C}_{TL} + A_T B_T^T + B_T A_T^T & \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge m(A_T) < m(A) $
5a	
	where
6	
8	
5b	
7	
	$\begin{pmatrix} C & C & \begin{pmatrix} \hat{C} & +A & DT + D & AT \end{pmatrix} \hat{C} & +A & DT + D & AT \end{pmatrix}$
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) \wedge \neg (m(A_T) < m(A)) $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	$A \rightarrow \left(\frac{A_T}{A_B}\right), B \rightarrow \left(\frac{B_T}{B_B}\right), C \rightarrow \left(\frac{C_{TL}}{C_{BL}}\right)$ where $A_T$ has 0 rows, $B_T$ has 0 rows, $C_{TL}$ is 0 × 0
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix}\right) $
3	while $m(A_T) < m(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge m(A_T) < m(A) $
5a	
	where
6	
8	
5b	
7	
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \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{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (m(A_T) < m(A)) $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	$A  o \left(\frac{A_T}{A_B}\right), B  o \left(\frac{B_T}{B_B}\right), C  o \left(\frac{C_{TL} C_{TR} }{C_{BL} C_{BR}}\right)$ where $A_T$ has 0 rows, $B_T$ has 0 rows, $C_{TL}$ is $0  imes 0$
2	$ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T   \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) $
3	while $m(A_T) < m(A)$ do
2,3	$\left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c c} \widehat{C}_{TL} + A_T B_T^T + B_T A_T^T & \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge m(A_T) < m(A)$
5a	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge m(A_T) < m(A) $ $ \left(\frac{A_T}{A_B}\right) \rightarrow \left(\frac{A_0}{a_1^T}\right),  \left(\frac{B_T}{B_B}\right) \rightarrow \left(\frac{B_0}{b_1^T}\right),  \left(\frac{C_{TL}}{C_{TR}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR}\right) \rightarrow \left(\frac{C_{00}}{c_{01}} \begin{vmatrix} C_{02} \\ C_{20} \end{vmatrix} c_{21} \begin{vmatrix} C_{22} \\ C_{22} \end{vmatrix} \right) $ where $a_1$ has 1 row, $b_1$ has 1 row, $\gamma_{11}$ is 1 × 1
6	
8	
5b	$\left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right)$
7	
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) \wedge \neg (m(A_T) < m(A)) $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	$A \rightarrow \left(\frac{A_T}{A_B}\right), B \rightarrow \left(\frac{B_T}{B_B}\right), C \rightarrow \left(\frac{C_{TL}}{C_{BL}}\right)$ where $A_T$ has 0 rows, $B_T$ has 0 rows, $C_{TL}$ is $0 \times 0$
2	$ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T   \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) $
3	while $m(A_T) < m(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge m(A_T) < m(A) $
5a	$ \left(\frac{A_T}{A_B}\right) \to \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \to \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL}}{C_{BL}}\right) \to \left(\frac{C_{TR}}{C_{BL}}\right) \to \left(\frac{C_{00}}{c_{01}}\right) \\ \xrightarrow{\text{where}}  a_1 \text{ has 1 row, } b_1 \text{ has 1 row, } \gamma_{11} \text{ is } 1 \times 1 $
6	$ \frac{\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 B_0^T + B_0 A_0^T + \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{c}_{10}^T & \widehat{\gamma}_{11} & \widehat{c}_{12}^T \\ \hline \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{pmatrix} $
8	
5b	$\left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right)$
7	
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) \wedge \neg (m(A_T) < m(A)) $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C=\widehat{C}$
4	$A  o \left(\frac{A_T}{A_B}\right), B  o \left(\frac{B_T}{B_B}\right), C  o \left(\frac{C_{TL} C_{TR} }{C_{BL} C_{BR}}\right)$ where $A_T$ has 0 rows, $B_T$ has 0 rows, $C_{TL}$ is $0  imes 0$
2	$ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T   \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) $
3	while $m(A_T) < m(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge m(A_T) < m(A) $
5a	$ \left(\frac{A_T}{A_B}\right) \to \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \to \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \to \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}^T   \gamma_{11}   c_{12}^T}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \to \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}   c_{11}   c_{12}^T}\right) $
6	where $a_1$ has 1 row, $b_1$ has 1 row, $\gamma_{11}$ is $1 \times 1$ $ \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 B_0^T + B_0 A_0^T + \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{c}_{10}^T & \widehat{\gamma}_{11} & \widehat{c}_{12}^T \\ \hline \widehat{c}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{pmatrix} $
8	
5b	$ \left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}^T   \gamma_{11}   c_{12}^T}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}   c_{12}}\right) \\ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \leftarrow \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}   c_{12}}\right) \\ \left(\frac{C_{10}   c_{11}   c_{12}}{C_{20}   c_{21}   c_{22}}\right) \\ \left(\frac{C_{10}   c_{11}   c_{12}}{C_{20}   c_{21}}\right) \\ \left(\frac{C_{10}   c_{11}   c_{12}}{C_{20}   c_{21}}\right) \\ \left(\frac{C_{10}   c_$
7	$\begin{pmatrix} \frac{C_{00}}{c_{01}} \begin{vmatrix} C_{02} \\ \overline{c_{10}} \end{vmatrix} \gamma_{11} \begin{vmatrix} \overline{c_{12}} \\ \overline{c_{20}} \end{vmatrix} c_{21} \begin{vmatrix} \overline{c_{22}} \end{vmatrix}$
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T}{\widehat{C}_{BL}}\right) $
	endwhile
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (m(A_T) < m(A)) $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
1a	$C = \widehat{C}$
4	$A  o \left(\frac{A_T}{A_B}\right), B  o \left(\frac{B_T}{B_B}\right), C  o \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right)$ where $A_T$ has 0 rows, $B_T$ has 0 rows, $C_{TL}$ is $0  imes 0$
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix}\right) $
3	while $m(A_T) < m(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge m(A_T) < m(A) $
5a	$ \left(\frac{A_T}{A_B}\right) \to \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \to \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) \to \left(\frac{C_{00}   c_{01}   C_{02}}{c_{10}^T   \gamma_{11}   c_{12}^T}\right) \\ \frac{C_{00}   c_{01}   C_{02}}{C_{02}   c_{21}   C_{22}} $
6	where $a_1$ has 1 row, $b_1$ has 1 row, $\gamma_{11}$ is $1 \times 1$ $ \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 B_0^T + B_0 A_0^T + \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{c}_{10}^T & \widehat{\gamma}_{11} & \widehat{c}_{12}^T \\ \hline \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{pmatrix} $
8	update line 1 : update line n
5b	$ \left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right) \\ \frac{C_{TL} C_{TR}}{C_{DL} C_{DR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10} \gamma_{11} c_{12}^T}\right) \\ \frac{C_{DL} C_{DR}}{C_{DL} C_{DR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10} \gamma_{11} c_{12}^T}\right) \\ \frac{C_{DL} C_{DR}}{C_{DL} C_{DR}}\right) \leftarrow \left(\frac{C_{DL} c_{01} c_{02}}{c_{10} c_{11} c_{12}}\right) \\ \frac{C_{DL} c_{11} c_{12}}{C_{DL} c_{11} c_{12}}$
7	$egin{pmatrix} C_{00} & c_{01} & C_{02} \ \hline c_{10}^T & \gamma_{11} & c_{12}^T \ \hline C_{20} & c_{21} & C_{22} \end{pmatrix}$
2	$ \left(\begin{array}{c c} C_{TL} & C_{TR} \\ C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c c} \widehat{C}_{TL} + A_T B_T^T + B_T A_T^T   \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \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{\widehat{C}_{TL} + A_T B_T^T + B_T A_T^T}{\widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} + A_T B_B^T + B_T A_B^T \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (m(A_T) < m(A)) $
1b	$[C] = \operatorname{syr}2k(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$
	$A \rightarrow \left(\frac{A_T}{A_B}\right), B \rightarrow \left(\frac{B_T}{B_B}\right), C \rightarrow \left(\frac{C_{TL}}{C_{BL}}\right)$ where $A_T$ has 0 rows, $B_T$ has 0 rows, $C_{TL}$ is $0 \times 0$
	while $m(A_T) < m(A)$ do
	$ \left(\frac{A_T}{A_B}\right) \to \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \to \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL}}{C_{BL}}\right) \to \left(\frac{C_{TR}}{C_{BL}}\right) \to \left(\frac{C_{00}}{c_{01}}\right) \\ \frac{C_{00}}{c_{01}} \left(\frac{C_{02}}{c_{01}}\right) \\ \frac{C_{00}}{c_{01}} \left(\frac{C_{02}}{c_{01}}\right) \\ \frac{C_{01}}{C_{02}} \left(\frac{C_{02}}{c_{01}}\right) \\ \frac{C_{02}}{C_{02}} \left(\frac{C_{02}}{c_{21}}\right) \\ C_{02$
	update line 1 : update line n
	$ \left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right) \\ \frac{C_{TL} C_{TR}}{C_{DL} C_{DR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right) \\ \frac{C_{DL} C_{DR}}{C_{DL} C_{DR}}\right) \leftarrow \left(\frac{C_{DL} c_{11} C_{12}}{C_{20} c_{21} C_{22}}\right) $
	endwhile

Algorithm:  $[C] := \text{SYR}2\text{K\_UNB\_VAR}2(A, B, C)$ 

$$A \to \left(\frac{A_T}{A_B}\right) , B \to \left(\frac{B_T}{B_B}\right) , C \to \left(\frac{C_{TL}}{C_{BL}}\right)$$

where  $A_T$  has 0 rows,  $B_T$  has 0 rows,  $C_{TL}$  is  $0 \times 0$ 

while  $m(A_T) < m(A)$  do

$$\left(\frac{A_T}{A_B}\right) \to \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \to \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \to \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right)$$

where  $a_1$  has 1 row,  $b_1$  has 1 row,  $\gamma_{11}$  is  $1 \times 1$ 

update line 1

:

update line n

$$\left(\frac{A_T}{A_B}\right) \leftarrow \left(\frac{A_0}{a_1^T}\right), \left(\frac{B_T}{B_B}\right) \leftarrow \left(\frac{B_0}{b_1^T}\right), \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right) \\
\left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10}^T \gamma_{11} c_{12}^T}\right) \\
\left(\frac{C_{00} c_{01} C_{02}}{C_{20} c_{21} C_{22}}\right) \leftarrow \left(\frac{C_{00} c_{01} C_{02}}{c_{10} c_{10} c_{12}}\right) \\
\left(\frac{C_{00} c_{01} c_{02}}{C_{02} c_{11} c_{22}}\right) + \left(\frac{C_{00} c_{01} c_{02}}{c_{10} c_{12}}\right) \\
\left(\frac{C_{00} c_{01} c_{02}}{C_{02} c_{11} c_{22}}\right) + \left(\frac{C_{00} c_{01} c_{02}}{c_{10} c_{12}}\right) \\
\left(\frac{C_{00} c_{01} c_{02}}{c_{10} c_{12}}\right) + \left(\frac{C_{00} c_{01} c_{02}}{c_{10} c_{12}}\right) \\
\left(\frac{C_{00} c_{01} c_{02}}{c_{10} c_{12}}\right) + \left(\frac{C_{00} c_{01} c_{02}}{c_{10} c_{12}}\right) \\
\left(\frac{C_{00} c_{01} c_{12}}{c_{12}}\right) + \left(\frac{C_{00} c_{01} c_{12}}{c_{12}}\right) \\
\left(\frac{C_{00} c_{01} c_{12}}{c_{12}}\right) + \left(\frac{C_{00} c_{01} c_{12}}{c_{12}}\right) \\
\left(\frac{C_{00} c_{01} c_{12}}{c_{12}}\right) + \left(\frac{C_{00} c_{01} c_{12}}{c_{12}}\right) \\
\left(\frac{C_{00} c_{11} c_{12}}{c_{12}}\right) + \left(\frac{C_{00} c_{11} c_{12}}{c_{12}}\right) \\
\left(\frac{C_{00} c_{11} c_{12}}{c_{12}}\right) + \left(\frac{C_{00} c_{12} c_{12}}{c_{12}}\right) \\
\left(\frac{C_{00} c_{12} c_{12}}{c_{12}}\right) + \left(\frac{C_{00} c_{12} c_{12}}{c_{12}}\right) \\
\left(\frac{C_{00}$$

endwhile