<table>
<tr><th>Step</th><th>Algorithm: $C = A^T A + C$</th></tr>
<tr><td>1a</td><td>$\{ C = \widehat{C} \quad \}$</td></tr>
<tr><td>4</td><td>$A \rightarrow \left(A_L \,\middle|\, A_R \right)$, $C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$
where A_L has 0 columns, C_{TL} is 0×0</td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$</td></tr>
<tr><td>3</td><td>while $n(A_L) < n(A)$ do</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A) \right\}$</td></tr>
<tr><td>5a</td><td>$\left(A_L \,\middle|\, A_R \right) \rightarrow \left(A_0 \,\middle|\, A_1 \;\; A_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|cc} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right)$
where γ_{11} is 1×1</td></tr>
<tr><td>6</td><td>$\left\{ \left(\begin{array}{c|cc} C_{00} & C_{01} & C_{02} \\ \hline C_{10}^T & \gamma_{11} & C_{12}^T \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|cc} A_0^T A_0 + \widehat{C}_{00} & \widehat{C}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$</td></tr>
<tr><td>8</td><td>$C_01 := A_0^T A_1 + \widehat{C}_01$
$\gamma_{11} := A_1^T A_1 + \widehat{\gamma}_{11}$</td></tr>
<tr><td>7</td><td>$\left\{ \left(\begin{array}{cc|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{cc|c} A_0^T A_0 + \widehat{C}_{00} & A_0^T A_1 + \widehat{C}_01 & \widehat{C}_{02} \\ \widehat{C}_{10}^T & \widehat{A}_1^T A_1 + \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \hline \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$</td></tr>
<tr><td>5b</td><td>$A \rightarrow \left(A_L \,\middle|\, A_R \right) \leftarrow \left(A_0 \;\; A_1 \,\middle|\, A_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{cc|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$</td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$</td></tr>
<tr><td></td><td>endwhile</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A)) \right\}$</td></tr>
<tr><td>1b</td><td>$\{ [C] = \text{syrk\_ac}(A, \widehat{C}) \quad \}$</td></tr>
</table>

Step	Algorithm: $C = A^T A + C$
1a	$\{ \qquad \}$
4	where
2	$\left\{ \qquad \right\}$
3	while do
2,3	$\left\{ \qquad \wedge \qquad \right\}$
5a	where
6	$\left\{ \qquad \right\}$
8	
7	$\left\{ \qquad \right\}$
5b	
2	$\left\{ \qquad \right\}$
	endwhile
2,3	$\left\{ \qquad \wedge \neg(\qquad) \qquad \right\}$
1b	$\{ \qquad \}$

Step	Algorithm: $C = A^T A + C$
1a	$\{C = \widehat{C}$ $\}$
4	where
2	$\left\{ \right\}$
3	while do
2,3	$\left\{ \wedge \right\}$
5a	where
6	$\left\{ \right\}$
8	
7	$\left\{ \right\}$
5b	
2	$\left\{ \right\}$
	endwhile
2,3	$\left\{ \wedge \neg(\quad) \right\}$
1b	$\{[C] = \text{syrk\_ac}(A, \widehat{C})$ $\}$

<table>
<tr><th>Step</th><th>Algorithm: $C = A^T A + C$</th></tr>
<tr><td>1a</td><td>$\{ C = \widehat{C} \qquad \}$</td></tr>
<tr><td>4</td><td>where</td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \right\}$</td></tr>
<tr><td>3</td><td>while do</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge \right\}$</td></tr>
<tr><td>5a</td><td>where</td></tr>
<tr><td>6</td><td>$\left\{ \qquad \right\}$</td></tr>
<tr><td>8</td><td></td></tr>
<tr><td>7</td><td>$\left\{ \qquad \right\}$</td></tr>
<tr><td>5b</td><td></td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \right\}$</td></tr>
<tr><td></td><td>endwhile</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge \neg(\qquad) \right\}$</td></tr>
<tr><td>1b</td><td>$\{ [C] = \mathrm{syrk\_ac}(A, \widehat{C}) \qquad \}$</td></tr>
</table>

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

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

Step	Algorithm: $C = A^T A + C$
1a	$\{ C = \widehat{C} \}$
4	$A \rightarrow \left(A_L \mid A_R \right)$, $C \rightarrow \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, C_{TL} is 0×0
2	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$
3	while $n(A_L) < n(A)$ do
2,3	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A) \right\}$
5a	$\left(A_L \mid A_R \right) \rightarrow \left(A_0 \mid A_1 \;\; A_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c\|cc} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right)$ where γ_{11} is 1×1
6	$\{ \}$
8	
7	$\{ \}$
5b	$A \rightarrow \left(A_L \mid A_R \right) \leftarrow \left(A_0 \;\; A_1 \mid A_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{cc\|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$
2	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg (n(A_L) < n(A)) \right\}$
1b	$\{ [C] = \text{syrk\_ac}(A, \widehat{C}) \}$

<table>
<tr><td>Step</td><td>Algorithm: $C = A^T A + C$</td></tr>
<tr><td>1a</td><td>$\{ C = \widehat{C} \}$</td></tr>
<tr><td>4</td><td>$A \rightarrow \left(A_L \,\middle\vert\, A_R \right)$, $C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$
where A_L has 0 columns, C_{TL} is 0×0</td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$</td></tr>
<tr><td>3</td><td>while $n(A_L) < n(A)$ do</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A) \right\}$</td></tr>
<tr><td>5a</td><td>$\left(A_L \,\middle\vert\, A_R \right) \rightarrow \left(A_0 \,\middle\vert\, A_1 \;\; A_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|cc} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right)$
where γ_{11} is 1×1</td></tr>
<tr><td>6</td><td>$\left\{ \left(\begin{array}{c|cc} C_{00} & C_{01} & C_{02} \\ \hline C_{10}^T & \gamma_{11} & C_{12}^T \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|cc} A_0^T A_0 + \widehat{C}_{00} & \widehat{C}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$</td></tr>
<tr><td>8</td><td></td></tr>
<tr><td>7</td><td>$\left\{ \qquad \right\}$</td></tr>
<tr><td>5b</td><td>$A \rightarrow \left(A_L \,\middle\vert\, A_R \right) \leftarrow \left(A_0 \;\; A_1 \,\middle\vert\, A_2 \right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{cc|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$</td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$</td></tr>
<tr><td></td><td>endwhile</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg (n(A_L) < n(A)) \right\}$</td></tr>
<tr><td>1b</td><td>$\{ [C] = \text{syrk\_ac}(A, \widehat{C}) \}$</td></tr>
</table>

<table>
<tr><td>Step</td><td>Algorithm: $C = A^T A + C$</td></tr>
<tr><td>1a</td><td>$\{ C = \widehat{C} \quad \}$</td></tr>
<tr><td>4</td><td>$A \rightarrow \left(\begin{array}{c|c} A_L & A_R \end{array} \right), \; C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$
where A_L has 0 columns, C_{TL} is 0×0</td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$</td></tr>
<tr><td>3</td><td>while $n(A_L) < n(A)$ do</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A) \right\}$</td></tr>
<tr><td>5a</td><td>$\left(\begin{array}{c|c} A_L & A_R \end{array} \right) \rightarrow \left(\begin{array}{c|cc} A_0 & A_1 & A_2 \end{array} \right), \; \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|cc} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right)$
where γ_{11} is 1×1</td></tr>
<tr><td>6</td><td>$\left\{ \left(\begin{array}{c|cc} C_{00} & C_{01} & C_{02} \\ \hline C_{10}^T & \gamma_{11} & C_{12}^T \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c|cc} A_0^T A_0 + \widehat{C}_{00} & \widehat{C}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$</td></tr>
<tr><td>8</td><td></td></tr>
<tr><td>7</td><td>$\left\{ \left(\begin{array}{cc|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{cc|c} A_0^T A_0 + \widehat{C}_{00} & A_0^T A_1 + \widehat{C}_0 1 & \widehat{C}_{02} \\ \widehat{C}_{10}^T & \widehat{A}_1^T A_1 + \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \hline \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$</td></tr>
<tr><td>5b</td><td>$A \rightarrow \left(\begin{array}{c|c} A_L & A_R \end{array} \right) \leftarrow \left(\begin{array}{cc|c} A_0 & A_1 & A_2 \end{array} \right), \; \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{cc|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$</td></tr>
<tr><td>2</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$</td></tr>
<tr><td></td><td>endwhile</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A)) \right\}$</td></tr>
<tr><td>1b</td><td>$\{ [C] = \text{syrk\_ac}(A, \widehat{C}) \quad \}$</td></tr>
</table>

Step	Algorithm: $C = A^T A + C$
1a	$\{ C = \widehat{C} \quad \}$
4	$A \rightarrow \left(A_L \,\middle|\, A_R \right)$, $C \rightarrow \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, C_{TL} is 0×0
2	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$
3	while $n(A_L) < n(A)$ do
2,3	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A) \right\}$
5a	$\left(A_L \,\middle|\, A_R \right) \rightarrow \left(A_0 \,\middle|\, A_1 \;\; A_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c\|cc} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right)$ where γ_{11} is 1×1
6	$\left\{ \left(\begin{array}{c\|cc} C_{00} & C_{01} & C_{02} \\ \hline C_{10}^T & \gamma_{11} & C_{12}^T \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{c\|cc} A_0^T A_0 + \widehat{C}_{00} & \widehat{C}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$
8	$C_0 1 := A_0^T A_1 + \widehat{C}_0 1$ $\gamma_{11} := A_1^T A_1 + \widehat{\gamma}_{11}$
7	$\left\{ \left(\begin{array}{cc\|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{cc\|c} A_0^T A_0 + \widehat{C}_{00} & A_0^T A_1 + \widehat{C}_0 1 & \widehat{C}_{02} \\ \widehat{C}_{10}^T & \widehat{A}_1^T A_1 + \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \hline \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$
5b	$A \rightarrow \left(A_L \,\middle|\, A_R \right) \leftarrow \left(A_0 \;\; A_1 \,\middle|\, A_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{cc\|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$
2	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A)) \right\}$
1b	$\{ [C] = \mathrm{syrk\_ac}(A, \widehat{C}) \quad \}$

	Algorithm: $C = A^T A + C$
	$A \rightarrow \left(A_L \,\Big\|\, A_R \right)$, $C \rightarrow \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, C_{TL} is 0×0
	while $n(A_L) < n(A)$ do
	$\left(A_L \,\Big\|\, A_R \right) \rightarrow \left(A_0 \,\Big\|\, A_1 \;\; A_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c\|cc} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right)$ where γ_{11} is 1×1
	$C_0 1 := A_0^T A_1 + \widehat{C}_0 1$ $\gamma_{11} := A_1^T A_1 + \widehat{\gamma}_{11}$
	$A \rightarrow \left(A_L \,\Big\|\, A_R \right) \leftarrow \left(A_0 \;\; A_1 \,\Big\|\, A_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{cc\|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$
	endwhile

Algorithm: $C = A^T A + C$

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

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

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

$$\left(A_L \,\middle|\, A_R \right) \rightarrow \left(A_0 \,\middle|\, A_1 \;\; A_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|cc} \widehat{C}_{00} & \widehat{c}_{01} & \widehat{C}_{02} \\ \hline \widehat{C}_{10}^T & \widehat{\gamma}_{11} & \widehat{C}_{12}^T \\ \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{array} \right)$$

where γ_{11} is 1×1

$C_01 := A_0^T A_1 + \widehat{C}_01$

$\gamma_{11} := A_1^T A_1 + \widehat{\gamma}_{11}$

$$A \rightarrow \left(A_L \,\middle|\, A_R \right) \leftarrow \left(A_0 \;\; A_1 \,\middle|\, A_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{cc|c} C_{00} & C_{01} & C_{02} \\ C_{10}^T & \gamma_{11} & C_{12}^T \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$$

endwhile