$M = 3$

$$\begin{pmatrix} a_1 & b_1 & 0 \\ c_1 & a_2 & b_2 \\ 0 & c_2 & a_3 \end{pmatrix} = \begin{pmatrix} l_1 & 0 & 0 \\ c_1 & l_2 & 0 \\ 0 & c_2 & l_3 \end{pmatrix} \begin{pmatrix} 1 & u_1 & 0 \\ 0 & 1 & u_2 \\ 0 & 0 & 1 \end{pmatrix}$$

$a_1 = l_1$ $\qquad\qquad$ $b_1 = l_1 u_1$

$a_2 = c_1 u_1 + l_2$ $\qquad$ $b_2 = l_2 u_2$

$a_3 = c_2 u_2 + l_3$

$l_1 = a_1$ $\qquad\qquad$ $u_1 = \dfrac{b_1}{l_1}$

$l_2 = a_2 - c_1 u_1$ $\qquad$ $u_2 = \dfrac{b_2}{l_2}$

$l_3 = a_3 - c_2 u_2$

$M = 4$ $\quad \begin{pmatrix} a_1 & b_1 & 0 & 0 \\ c_1 & a_2 & b_2 & 0 \\ 0 & c_2 & a_3 & b_3 \\ 0 & 0 & c_3 & a_4 \end{pmatrix} = \begin{pmatrix} l_1 & 0 & 0 & 0 \\ c_1 & l_2 & 0 & 0 \\ 0 & c_2 & l_3 & 0 \\ 0 & 0 & c_3 & l_4 \end{pmatrix} \begin{pmatrix} 1 & u_1 & 0 & 0 \\ 0 & 1 & u_2 & 0 \\ 0 & 0 & 1 & u_3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

$a_1 = l_1$ $\qquad\qquad$ $b_1 = l_1 u_1$ $\qquad$ $\Rightarrow$ $\quad$ $l_1 = a_1$ $\qquad$ $u_1 = \dfrac{b_1}{l_1}$

$a_2 = c_1 u_1 + l_2$ $\qquad$ $b_2 = l_2 u_2$ $\qquad\qquad\qquad$ $l_2 = a_2 - c_1 u_1$ $\qquad$ $u_2 = \dfrac{b_2}{l_2}$

$a_3 = c_2 u_2 + l_3$ $\qquad$ $b_3 = l_3 u_3$ $\qquad\qquad\qquad$ $l_3 = a_3 - c_2 u_2$ $\qquad$ $u_3 = \dfrac{b_3}{l_3}$

$a_4 = c_3 u_3 + l_4$ $\qquad\qquad\qquad\qquad\qquad\qquad$ $l_4 = a_4 - c_3 u_3$

Además

$$LUx = d \implies \begin{array}{c} Ux = y \\ Ly = d \end{array}$$

$$\begin{pmatrix} l_1 & 0 & 0 \\ c_1 & l_2 & 0 \\ 0 & c_2 & l_3 \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix} = \begin{pmatrix} d_1 \\ d_2 \\ d_3 \end{pmatrix}$$

$y_1 = d_1$

$y_2 = (d_2 - c_1 y_1)/l_2$

$y_3 = (d_3 - c_2 y_2)/l_3$

$$\begin{pmatrix} 1 & u_1 & 0 \\ 0 & 1 & u_2 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix}$$

$x_3 = y_3$

$x_2 = y_2 - u_2 x_3$

$x_1 = y_1 - u_1 x_2$

Observando, nos damos cuenta que:

$l_1 = a_1$

$y_1 = d_1/l_1 \to 1$ flop (división)

Para $i = 2 \dots m$.

Por iteración:
$\begin{cases} 1 \text{ flop (división)} & \leftarrow u_{i-1} = b_{i-1}/l_{i-1} \\ 2 \text{ flop (resta, división)} & \leftarrow l_i = a_i - c_{i-1} u_{i-1} \to \\ 3 \text{ flop (resta, div, mult)} & \leftarrow y_i = (d_i - c_{i-1} y_{i-1})/l_i \to \end{cases}$

$x_m = y_m$

Para $k = m-1 \dots 1 \longrightarrow 2$ flop (resta, multiplicación) por iteración

$x_k = y_k - u_k x_{k+1}$

$\text{flops} = 1 + \sum_{i=2}^{m} 8 = 1 - 8 + \sum_{i=1}^{m} 8$

$= 8 \sum_{i=1}^{m} 1 - 7 = 8m - 7 \text{ flops.}$