Observer Pole Placement in OCF

Consider a single-output system in OCF:

$$\dot{x} = Ax$$
$$y = Cx, \qquad y \in \mathbb{R}$$

$$\text{where } A = \begin{pmatrix} 0 & 0 & \ldots & 0 & 0 & -a_n \\ 1 & 0 & \ldots & 0 & 0 & -a_{n-1} \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & 0 & \ldots & 1 & 0 & -a_2 \\ 0 & 0 & \ldots & 0 & 1 & -a_1 \end{pmatrix}, \qquad C = \begin{pmatrix} 0 & 0 & \ldots & 0 & 1 \end{pmatrix}$$

Note that A^T has the form of a CCF system matrix, thus:

$$\det(Is - A) = \det((Is - A)^T) = \det(Is - A^T)$$
$$= s^n + a_1 s^{n-1} + \ldots + a_{n-1}s + a_n$$