Case I.(A)

Assumption I

$$\begin{aligned}\Delta + (m-\ell) &\leq \min\{n-\Delta+1+m-\ell, n-\Delta+\ell\} \quad \text{or}\\ \Delta+1+\ell &\leq \min\{n-\Delta+1+m-\ell, n-\Delta+\ell\}\end{aligned}$$

Assumption A:

$$4 \leq 2\ell \leq m+1$$

No escape:

$$\Delta \leq m-\ell+1$$

Encircle:

$$2\Delta \geq m-2\ell-1$$

Case I.(B)

Assumption I

$$\begin{aligned}\Delta + (m-\ell) &\leq \min\{n-\Delta+1+m-\ell, n-\Delta+\ell\} \quad \text{or}\\ \Delta+1+\ell &\leq \min\{n-\Delta+1+m-\ell, n-\Delta+\ell\}\end{aligned}$$

Assumption B:

$$m+1 \leq 2\ell \leq 2m-2$$

No escape:

$$\Delta \leq \ell$$

Encircle:

$$2\ell - m + 1 \leq 2\Delta$$

Case II.(A)

Assumption II

$$\begin{aligned}n-\Delta+1+m-\ell &\leq \min\{\Delta+(m-\ell), \Delta+1+\ell\} \quad \text{or}\\ n-\Delta+\ell &\leq \min\{\Delta+(m-\ell), \Delta+1+\ell\}\end{aligned}$$

Assumption A.

$$4 \leq 2\ell \leq m+1$$

No Escape:

$$\Delta \leq n-m+\ell$$

Encircle:

$$2\Delta \leq 2n+2\ell-m-1$$

Case II.(B)

Assumption II:

$$n-\Delta+1+m-\ell \leq \min\{\Delta+(m-\ell), \Delta+1+\ell\} \quad \text{or}$$
$$n-\Delta+\ell \leq \min\{\Delta+(m-\ell), \Delta+1+\ell\}$$

Assumption B.

$$m+1 \leq 2\ell \leq 2m-2$$

No Escape:

$$\Delta \geq n-\ell-1$$

To Encircle:

$$2\Delta \leq 2n+m-2\ell+1$$