

**Case 3**  $i < \frac{row}{2}$  and  $j \geq \frac{col}{2}$ .

$$\Gamma'_{ij} = \left\langle \frac{A_{ri,j}^R + A_{ri+1}^R}{\sqrt{2}}, \frac{B_{cj}^C - B_{cj+1}^C}{\sqrt{2}} \right\rangle$$

$$\Gamma'_{i,j} = \frac{1}{2} (\langle A_{ri}^R, B_{cj}^C \rangle + \langle A_{ri+1}^R, B_{cj}^C \rangle - \langle A_{ri}^R, B_{cj+1}^C \rangle - \langle A_{ri+1}^R, B_{cj+1}^C \rangle)$$

$$\psi(AB) = \psi(\Gamma)$$

$$(\Gamma) = \psi \langle A_{ri}, B_{cj} \rangle$$

$$\psi_{1C}(\Gamma)_{i,j} = \frac{1}{\sqrt{2}} \langle A_{ri}, B_{cj} \rangle + \langle A_{ri+1}, B_{cj} \rangle$$

$$\psi_{1C}(\Gamma)_{i,j+1} = \frac{1}{\sqrt{2}} \langle A_{ri}, B_{cj+1} \rangle + \langle A_{ri+1}, B_{cj+1} \rangle$$

$$\psi(\Gamma) = \frac{1}{\sqrt{2}} (\psi_{1C}(\Gamma)_{i,j} - \psi_{1C}(\Gamma)_{i,j+1})$$

$$\psi(\Gamma) = \frac{1}{2} (\langle A_{ri}, B_{cj} \rangle + \langle A_{ri+1}, B_{cj} \rangle - \langle A_{ri}, B_{cj+1} \rangle - \langle A_{ri+1}, B_{cj+1} \rangle)$$