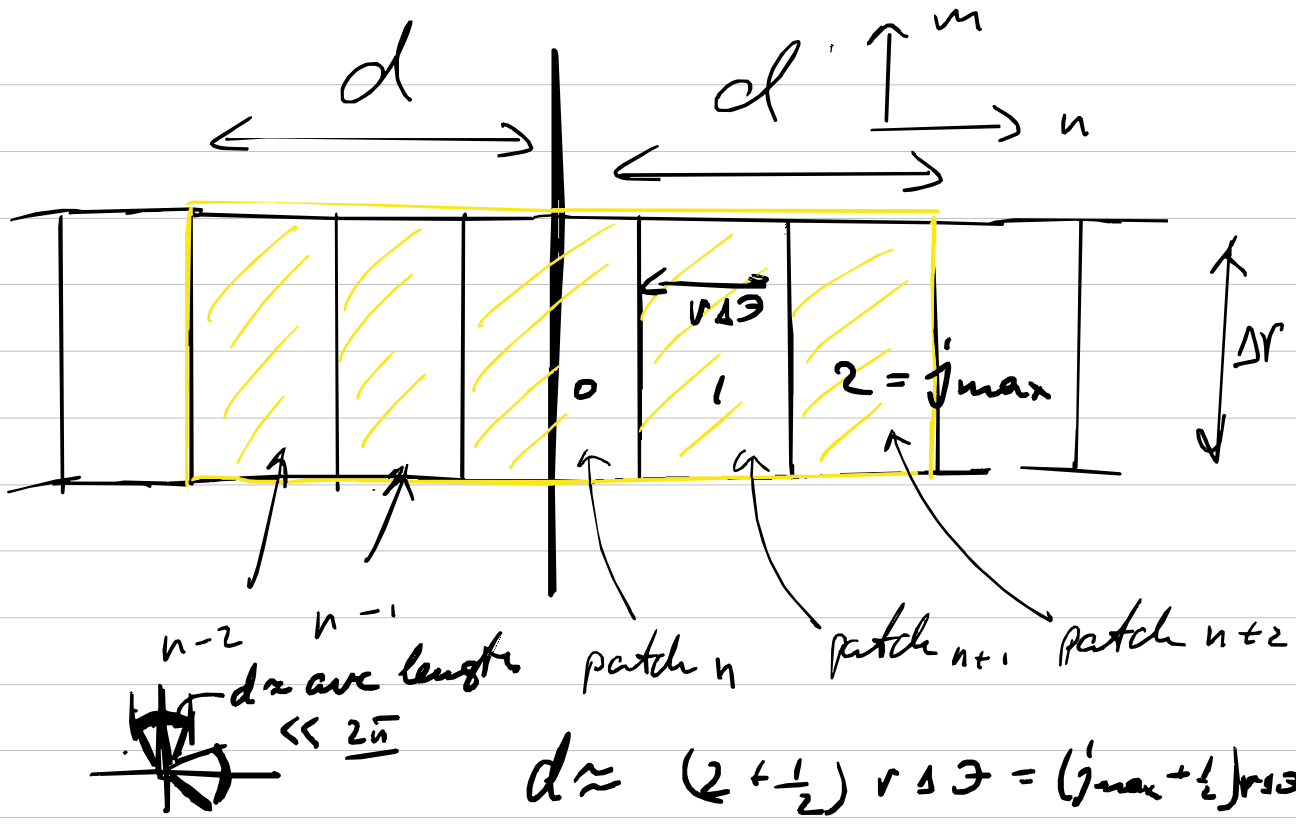

$$d \approx \left(2 + \tfrac{1}{2}\right) r\,\Delta\theta = \left(j_{max} + \tfrac{1}{2}\right) r\,\Delta\theta$$

- First, update rules for ρ (MT density)

$$\rho_m(k+1) = \left[\rho_m(k) - \left(\frac{j_R - j_L}{\Delta r}\right)\Delta t\right]$$

(time; this [stuff] stays the same as before; advective currents)

$$- b\,\rho_m(k)\,\Delta t + a\,\underbrace{(m+1)}_{r}\,\Delta r\,\Delta\theta\,\Delta t\left(\sum_{j=-j_{max}}^{+j_{max}} \phi_{m,n-j}(k)\right)$$

Where $j_{max} = \dfrac{d}{(m+1)\Delta r\,\Delta\theta} - \dfrac{1}{2}$

$d = \left(j_{max} + \tfrac{1}{2}\right) r\,\Delta\theta$

Round this up to the nearest integer

For example, in the above drawing, $j_{max} = 2$, so j goes from -2 to $+2$ $(-2, -1, 0, 1, 2)$

- Next, update rules for ϕ (DL density)

For those n that are within the zone of exchange around a given MT (i.e. the yellow zone)

$$\phi_{m,n}(k+1) = \left[\phi_{m,n}(k) - \frac{\Delta t}{(m+1)\Delta r}\left((m+2)J_R^r - (m+1)J_L^r\right)\right.$$

(this [stuff])

$$\left. - \frac{\Delta t}{(m+1)\Delta r\,\Delta\theta}\left(J_R^\theta - J_L^\theta\right)\right]$$

$$- a\,\phi_{m,n}(k)\,\Delta t + \sum_{\text{tubules within the range}} \frac{b\,\rho_m^{\text{tubule}}(k)\,\Delta t}{(m+1)\,\Delta r\,\Delta\theta\,(1+2j_{max})}$$

(this sum is only if the yellow zones overlap)

For those n that are outside the zone of exchange around any of the MTs, the last two terms are absent. (I believe you follow this idea in your current code)