

We work on project about mobile cellular networks. In a part of the project, we faced the problem about the proof of convergence of following iterative function:

$$p_i^{(t+1)} = \frac{\eta_i h_i^k}{(\mu + \sum_{\substack{j=1 \\ j \neq i}}^n p_j^t h_j)^k}$$

- Function is defined on  $(\mathbb{R}^+)^n \rightarrow (\mathbb{R}^+)^n$ .
- $p_i^t$  is value of  $p_i$  in iteration  $t$ .
- $\eta_i$  and  $h_i$  values are constant for each  $i$ .
- $\mu$  is greater than zero and it's value is constant for all  $i$ s.
- $k \in \mathbb{Z}: k \geq 2$
- $P^t = (p_1^t, p_2^t, \dots)$

We observed in simulations that for each special value of  $k$ , this function for each initial value  $P^0$  don't converge always But if the initial value  $P^0$  be near to the fixed point, the function converge to the fixed point. Therefore, it seems to have local convergence. We are going to prove this matter.

Note : In simulations, initial Value for  $P^0$  components are always real numbers between 0 and 1.

please represent a solution and help us. Even if this problem be solved for  $k = 2$ , it can be helpful for us.

Best Regards

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