1014-35-1648 **Saziye Bayram***, SUNY at Buffalo, 244 Mathematics Building, Buffalo, NY 14260. *Modeling in Kidney Functions.*

Previously, Pitman et al. (2002) derived a reduced, integral model of the tubuloglomerular feedback system (TGF). This reduced model describes the fluid flow up the thick ascending limb of a single model short-looped nephron, dependent on model parameters specifying a gain and a time delay of the TGF system. More recently, Pitman et al. (2004) examined the effect of coupling two nephrons described by the PDE model of Layton et al. (1991). In the present study, the single-nephron integral model is extended to coupled systems. A nearest neighbor coupling of three, or arbitrary N, nephrons branching from the same cortical radial artery (CRA) is proposed. Explicit analysis of the model equations for special cases is presented, together with the supporting numerical simulations. It is shown that the region of parameter space where limit cycle oscillations occurs is larger when coupling of nephrons is present. In addition, if the time delays of the individual nephrons do not differ by too much, then a synchronization of oscillations occurs among them. (Received September 28, 2005)