

1105-37-69

Aminur Rahman* (ar276@njit.edu), 323 Martin Luther King Jr. Blvd, Department of Mathematical Sciences, Culimore Hall, Newark, NJ 07102. *Further Analysis of Discrete Dynamical Models of the RS Flip-Flop Circuit.*

Logical R-S flip-flop circuits are investigated once again in the context of discrete planar dynamical systems, but this time starting with simple bilinear (minimal) component models based on fundamental principles. The dynamics of the minimal model is described in detail, and shown to exhibit some of the expected properties, but not the chaotic regimes typically found in simulations of physical realizations of R-S flip-flop circuits. Any physical realization of an ideal logical circuit must necessarily involve small perturbations and possibly some symmetry-breaking of any exact mathematical model. Therefore, perturbed forms of the minimal model are also analyzed in considerable detail. It is proved that perturbed minimal models can exhibit chaotic regimes as well as some of the bifurcation features present in several more elaborate and less fundamentally grounded dynamical models that have been investigated in the recent literature. Validation of the complexity of the dynamics discovered for the perturbed models is also provided by numerical simulation and computation of such dynamical indicators as Lyapunov exponents. (Received September 03, 2014)