Autonomous Boolean Models of Regulatory Networks MENGYANG SUN, XIANRUI CHENG, JOSHUA SOCOLAR, Duke physics — Autonomous Boolean network (ABN) models have been developed to represent directly the connectivity, logic, and timing of updates in regulatory networks. [1] An ABN is a Boolean network in which the sequence of updates of nodes is determined internally by time delay parameters associated with each link. We propose a method to convert a given ODE model into an ABN that is applicable when the ODE dynamics produces clearly separated high and low values at each node. The ODE parameters are mapped into ABN logic and delay parameters using only local information about each link. Using the example of Ingolia's ODE model of the regulatory network that maintains segment boundaries in the *Drosophila* embryo [2], we show that the resulting ABN model captures both the biologically relevant outcomes and the transient dynamics of the ODE model, and that the ABN framework provides direct insights into the mechanism supporting the biological function. [1] X. Cheng, M. Sun, and J. E. S. Socolar, 2012, J. R. Soc. Interface, (DOI: 10.1098/rsif.2012.0574) [2] Ingolia NT., 2004, PLoS Biol. 2, 805-815. (DOI:10.1371/journal.pbio.0020123)

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