Marten, Frank, Serafim Rodrigues, Piotr Suffczynski, Mark P. Richardson, and John R. Terry. 2009. Derivation and analysis of an ordinary differential equation mean-field model for studying clinically recorded epilepsy dynamics. *Phys. Rev.* E 79, 021911.

See https://journals.aps.org/pre/abstract/10.1103/PhysRevE.79.021911 . Accessed 27 March 20223.

ABSTRACT: In this paper we describe how an ordinary differential equation model of corticothalamic interactions may be obtained from a more general system of delay differential equations. We demonstrate that transitions to epileptic dynamics via changes in system parameters are qualitatively the same as in the original model with delay, as well as demonstrating that the onset of epileptic activity may arise due to regions of bistability. Hence, the model presents in one unique framework, two competing theories for the genesis of epileptiform activity. Similarities between model transitions and clinical data are presented and we argue that statistics obtained from, and a parameter estimation of this model may be a potential means of classifying and predicting the onset and offset of seizure activity.