Non-invasive techniques such as functional Magnetic Resonance Imaging (fMRI), ElectroEncephaloGraphy (EEG) and MagnetoEncephaloGraphy (MEG) provide entry points to human brain dynamics for clinical purposes, as well as the study of human behavior and cognition. Each of these observation technologies provides spatiotemporal information about the on-going neural activity in the cortex. Unfortunately measures are generally noisy, and it is difficult to identify the equation which governs the dynamics of neural activity.

Jirsa and Haken (1996) have formulated continuous models to predict neural activity, using brain anatomy leads to the following evolution problem

\[ u_{tt} - \alpha \Delta u = a(u,p)u_t + b(u,p,p_t), \quad \text{in } [0, +\infty) \times \Omega \]  
\[ u(0, \cdot) = u_0, \quad u_t(0, \cdot) = u_1. \]  
\[ u_0 = 0, \quad \text{on } [0, +\infty) \times \partial \Omega \]  

where \( \Omega \) is an open bounded domain in \( \mathbb{R}^n (n \leq 4) \) with sufficiently smooth boundary \( \partial \Omega \) and \( p \) is a smooth given function modelling the external stimulus (input), \( a \) and \( b \) are nonlinear functions.

In my presentation I will briefly describe and explain Jirsa and Haken model’s and present existence and uniqueness result for Equation (1) as well as the main ideas of the proof.