Microwave dynamics of the system of two weakly-coupled spin-torque nano-oscillators (STNOs) was analyzed. A numerical procedure for the determination of the system’s state (synchronization is present or absent) based on the analysis of the complex order parameter variations over time is proposed. Estimation for the minimum number of simulations required for the robust analysis of the system’s state has been made. Influence of variation of frequency on synchronization process was analyzed.

Using numerical analysis we show that the synchronization of two STNOs is possible only for a small variation of $\Delta R$ over time. The obtained results allow one to refine existing data on STNO synchronization and are important for the development of microwave systems with many STNOs.