

In this paper, I describe my research in the field of chaos theory 2016-2021. It addresses the question of the extent to which the Ergodic Theorem is applicable to a chaos pendulum in physical reality or whether friction inhibits its validity.

Core of my experimental setup is a modified chaos pendulum. With an evaluation program I illustrated phase spaces. From the data collected, the following evidence-based conclusions could be drawn.

- i) At my pendulum, chaos is frequency-dependent.
- ii) Friction shifts the CEF backward.
- iii) Friction leads to a transition to periodicity and breaks ergodicity.
- iv) At high frequencies, friction loses its influence and allows partial ergodicity.

From this I conclude a limited validity of the ergodic theorem and consequences for the stability of limit cycles, which depend on the function of selection between diverging and converging trajectories. I describe in the paper the making and verification of a program to explore this aspect.