The theory of dynamical systems is widely used in many branches of modern science. Its methods and tools are applied not only to solve strictly technical problems, but also in the analysis of phenomena such as climate changes, the behavior of financial markets or processes occurring in human brain. Dynamical scientists are especially interested in networks of coupled systems – a kind of a global structures, within which many smaller elements (called oscillators, or nodes) are connected and can exchange particular types of information.

Considering such networks, one can expect two typical dynamical responses, which are well–known from many years. The first one is the synchronization phenomenon, which occurs when the connections between units creating the network are strong enough. It is characterized by common, regular motion of all nodes and can be found universally in nature (e.g., the V formation of flying birds). On the other hand, when the coupling is weak, one can observe irregular behaviors (a desynchronized state) and chaotic motion, which has unpredictable character and is usually hard to determine. The famous butterfly effect described by Lorenz is an excellent example of how complex and beautiful the nature can be.

Less than two decades ago, in 2002 a kind of a hybrid state has been reported, characterized by the co–existence of two phenomena described above – the so–called *chimera state*. The chimera occurs, when a group of oscillators creating the network behaves coherently (the dynamics is collective), while the rest moves irregularly, forming an incoherent (chaotic) domain. What is especially interesting, both types of patterns are present within the network's structure and their appearance is spontaneous.

The aim of the research project is to study the intriguing, chimera creatures in networks of oscillators with moving support. Most of the studies so far have been focused on coupled nodes, where only the connections between units influenced on the appearance and character of observed states. In contrast to this, the current project investigates more complex models, where the information (energy) can be also transferred through the common, central node (the so–called *central hub node*), which is globally coupled with each particular unit. This type of system can be easily visualized by numerous physical pendula hanged on an oscillating platform, where the build-in mechanisms (e.g., the escapement mechanism from classical metronomes) and inertia forces induce the motion. Since chimeras have not been previously studied in such models, the importance of the research project becomes essential for better understanding the phenomenon in general.

During the project the existence and the character of chimera and chimera–like states in networks with moving support will be examined. The influence of the support, especially its parameters and type will be studied, allowing to describe the relation between its presence and occurrence of chimeric dynamics. Apart from this, a classical study of other system's parameters will be performed, determining the regions of chimeras' co–existence and their properties. The study will also investigate varied network size, tracing potential other phenomena that can appear in considered types of models. The latter one is especially interesting, since many other dynamical patterns may be uncovered, or even experimentally confirmed (networks of small size, for up to few oscillators can be practically designed).

The research performed during the project will allow to determine the degree of universality of chimera states in networks of oscillators coupled by both internal connections and the central hub. One can suppose, that the support's characteristics, as well as other parameters play a crucial role in the appearance of investigated patterns. Moreover, the study may reveal new interesting concepts, related with chimera states, which has been confirmed in the preliminary results. A thorough study planned for the project will result not only in better understanding of chimera states themselves, but also in general development of the nonlinear dynamics discipline, which applications can be found anywhere in science.