The continuous development of wireless systems requires the utilization of broad bandwidth since more and more devices and functionalities are integrated within single device. On the other hand there are wireless measurement systems and radars, which require broad bandwidth since the precision of measurements results from the available bandwidth. The examples of these broadband systems include detection of drones, georadars, direction finding systems, mine detection systems, and many others. Moreover, due to the fact that the number of the deployed systems is constantly increasing, and they all require wide bandwidth, modern wireless systems are deployed at millimeter waves, so at frequencies above 30 GHz.

Modern systems often take advantage of complex signal processing and artificial intelligence to improve performance. However, all software based techniques used for system improvements can be implemented only within the boundaries set by hardware solutions utilized in the system. In the case of wireless systems the main bottleneck of the system is the utilized radio front-end, and especially the antenna, since this component limits the available bandwidth the most.

All of the mentioned requirements of modern wireless systems calls for the development of broadband antennas. In particular, the most desirable by wireless measurement systems antennas should feature constant field-of-view to introduce the least amount of measurement errors.

This project aims at developing the techniques which will allow to realize broadband antennas with constant field of view by utilization of microwave lenses. The goal of the project is finding the answer to the question whether it is possible to realize microwave lenses that will feature self- similar behavior in very broad frequency range. And whether it is possible to realize such lenses with additive manufacturing techniques, including 3D printing.