Interest in alternative energy resources has grown dramatically in the past decades. It is due to the increased environmental pollution and a threat of global warming. Burning of the fossil fuels is believed to be the main cause of a greenhouse effect. An important number of new solutions have been proposed to generate energy from low temperature heat sources. They are now applied to such diversified fields as solar thermal power, geothermal power, biomass combustion. The Organic Rankine Cycle is a very promising technology from point of view of renewable energy sources. A typical ORC system (Fig.1) consists of an evaporator, condenser, pump, regenerator and the heart of the system – turbine driving a generator. Optimization of the main part of the ORC system provides an increase of economic efficiency of the whole installation.

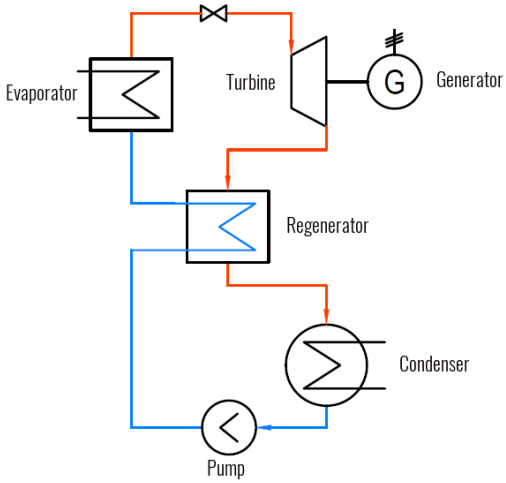

Fig. 1 An ORC system scheme

It is human nature to seek the best option among that are available. Nature, too, seems to be guided by optimization – many laws of nature have a vibrational character. Optimization has been a popular research topic for decades. There are many algorithms offered by different authors in the literature for this task. Among the swarm algorithms, the most popular are Ant Colony Optimization Artificial Bee Colony (ABC), Bee Colony Optimization (BCO). Interest in swarm algorithms has dynamically increased because they have demonstrated some promising results in solving tough optimization problems. In general, these algorithms tend to be flexible, efficient and highly adaptable, and yet easy to implement. All of these algorithms have one disadvantage - while solving complex problems good results such as a global extremum will be reached but the method needs a lot of time.

In 3D optimization of microturbine ORC it is very important to reduce the CPU time of the optimisation process. Therefore, 3D computational grids used during optimization are relatively coarse. One of the method of increasing the efficiency of the optimization algorithms is hybridization. Hybridization is a combination of two or more of algorithms so as to combine good features and eliminate drawbacks of particular algorithms.

The aim of the project is to elaborate a robust hybrid stochastic/deterministic method of optimization of the blading system for the ORC microturbine. The proposed method will draw on a combination of a swarm algorithm and the Nelder – Mead method of deformed polyhedron. The obtained results of optimization of the ORC 100kW microturbine blading system will be compared with the results obtained from other stochastic and deterministic optimizations algorithms.