

# Mathematical modeling of hydrodynamic processes in the rotors of flow micro-hydropower plants

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**Abstract** - The paper is dedicated to the study of hydrodynamic effects in the rotors of flow micro-hydropower plants. There was argued the geometry of hydrodynamic profiles of blades efficient in terms of energy conversion efficiency based on which original concepts of hydrodynamic rotors were developed. Using the CAD models of the proposed rotors: there were performed complex CFD simulations of the transient fluid flow through the rotors and near the blades in order to determine the influence of the constructive and kinematic parameters on the power characteristics and hydrodynamic performance factor of the rotors used in micro-hydropower plants; the fluid flow phenomenon was analyzed in the boundary layer and there were identified technical solutions for control and minimization of its negative impact on the energy conversion of the micro-hydropower plants.

**Keywords:** mathematical modeling, CFD numerical simulation, boundary layer, turbulent flow, hydrodynamic rotor, small hydropower plant.

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