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VERTICAL AXIS WIND TURBINE WITH AERODYNAMIC PROTECTION AGAINST OVERLOADS

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Goal:

The goal is to create a turbine with a vertical axis, which would ensure the sensitivity of the repositioning of the blades under an angle of attack $\alpha_m \neq \alpha_{opt}$ and the braking of the angular velocity of the rotating shaft.

Solution:

The technical problem, which the invention solves, consists in the creation of a turbine with a vertical axis, which would ensure the sensitivity of the repositioning of the blades under an angle of attack $\alpha_m \neq \alpha_{opt}$ and the braking of the angular speed of the rotating shaft at speeds of air currents U_∞ that exceed the maximum limit admissible provided that the mechanical tensioning of the blades by their twisting deformation is excluded.

Advantages:

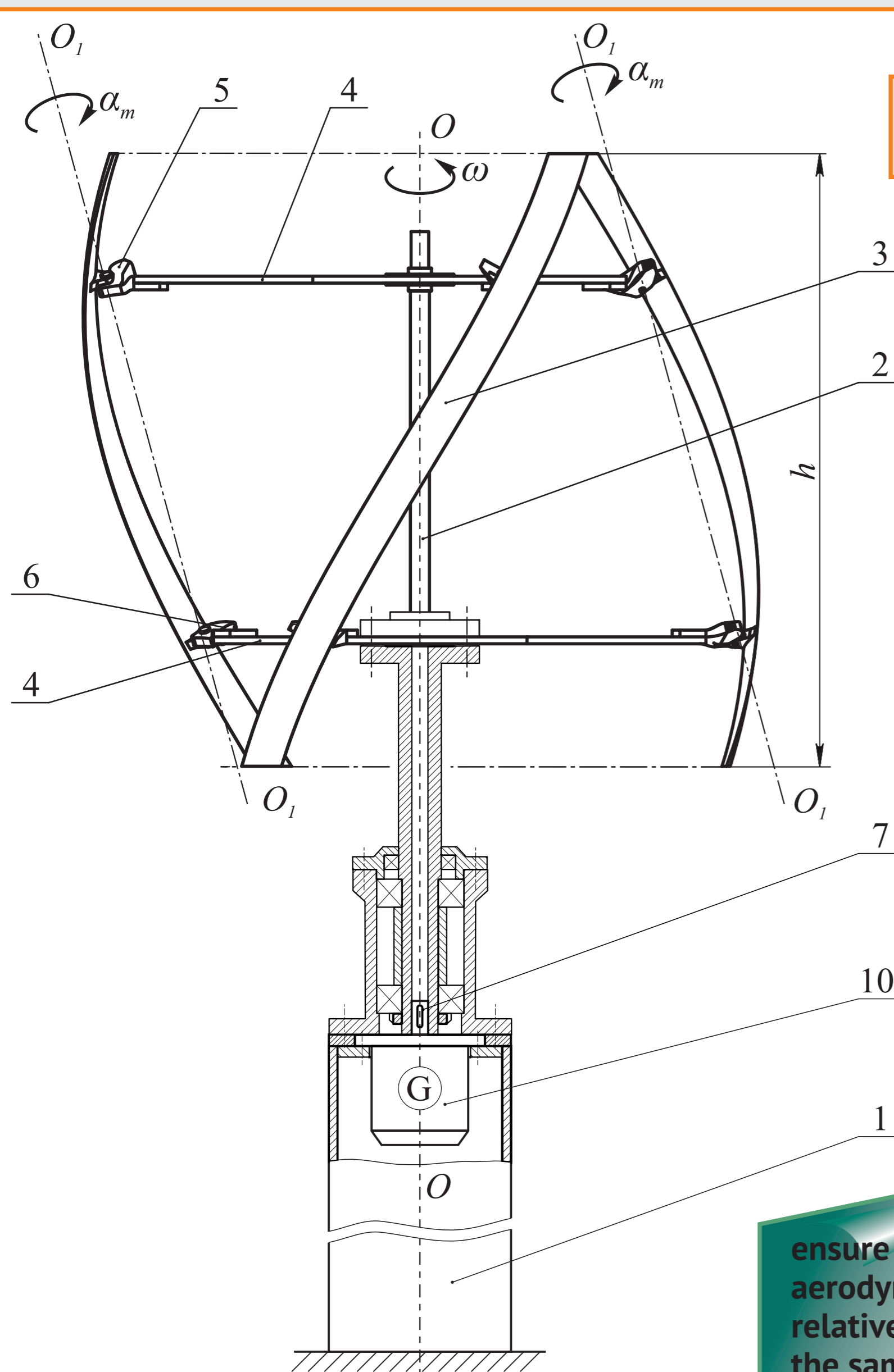
Ensuring at maximum speeds of the air currents, respectively, at high angular speeds of the rotating shaft, the possibility of self-repositioning by pivoting the blades with an aerodynamic profile at an angle of attack $\alpha_m \neq \alpha_{opt}$, at which to cause an increase in the aerodynamic resistance force F_D of the blade and decreasing the rotational angular velocity of the implicit wheel shaft and electric generator.

Stage:

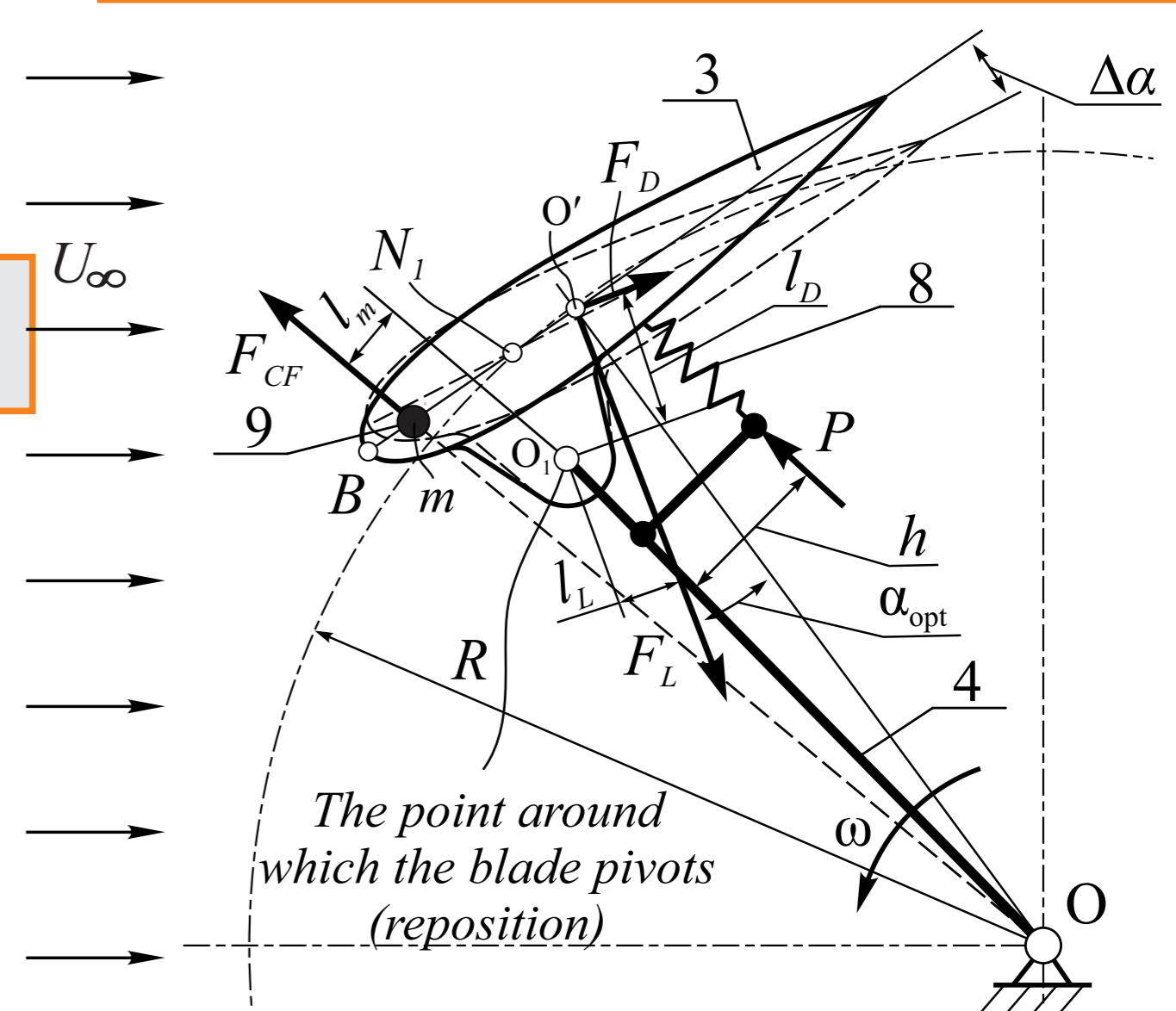
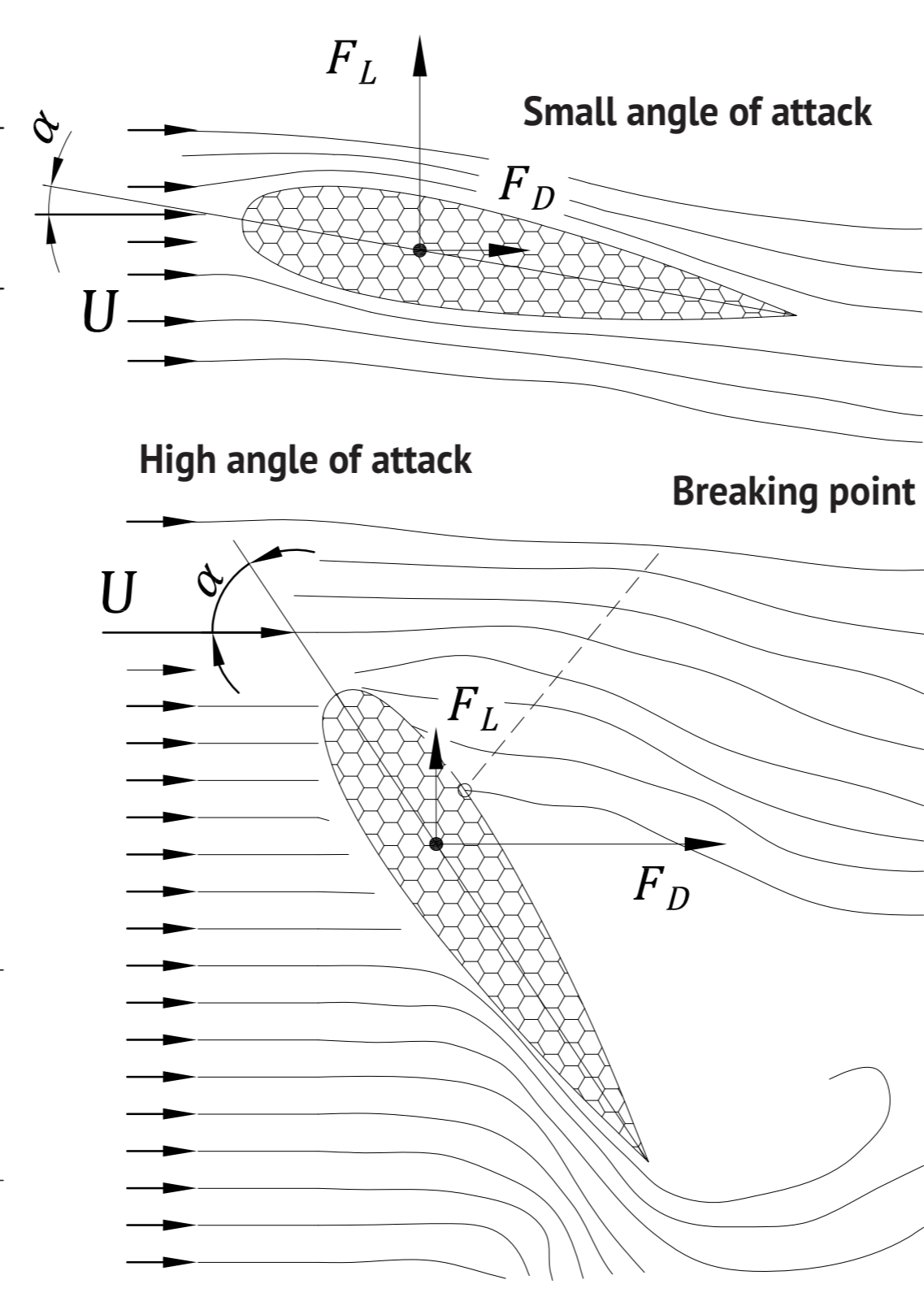
Computerized 3D model.

The constructive-kinematic scheme of the helical blade with aerodynamic profile and self-changeable angle of attack at the maximum wind speed limit (variant I: $BN_1 < BO'$)

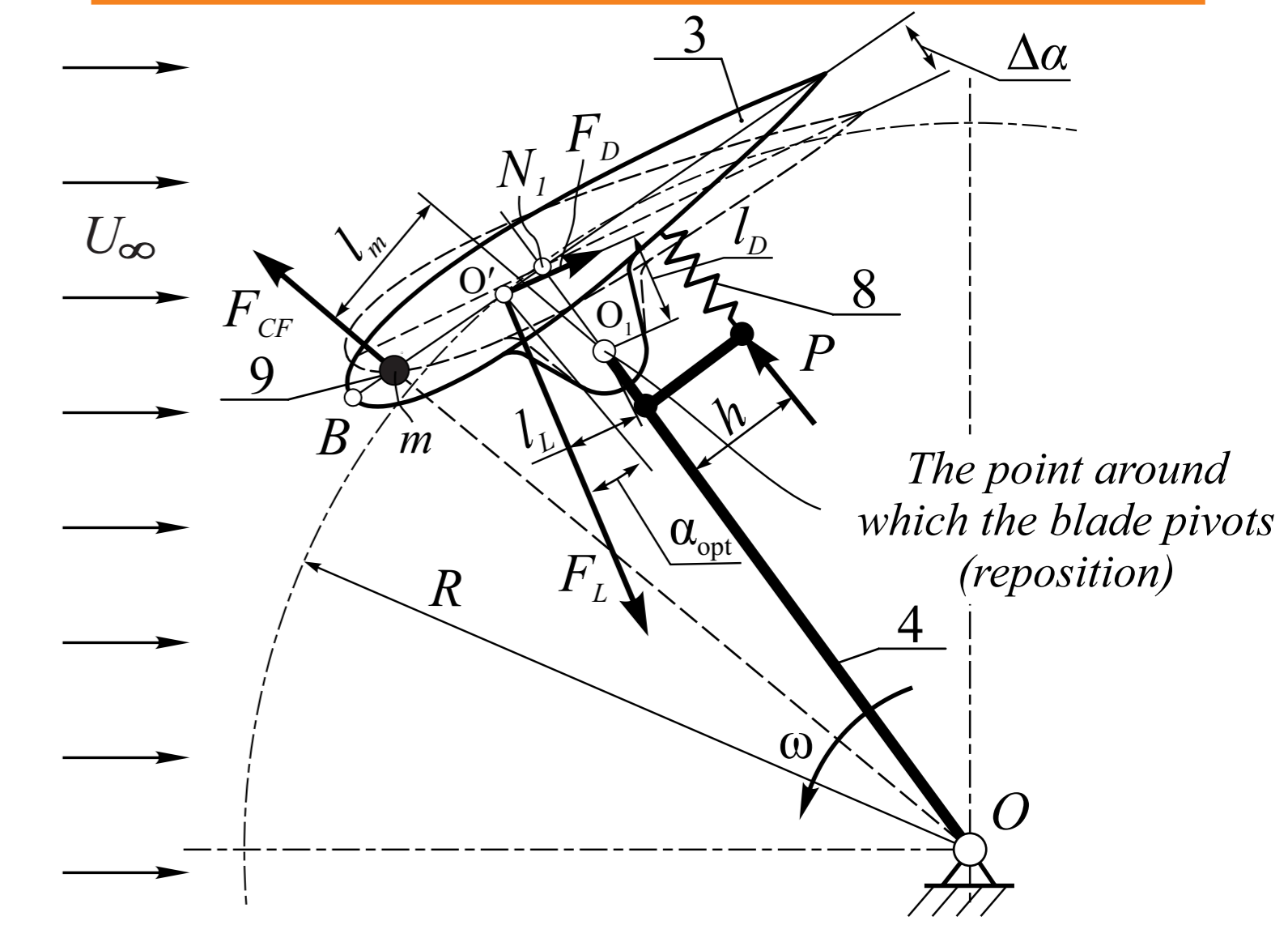
Vertical axis wind turbine with non-deformable helical blades and self-changing angle of attack $\alpha_m \neq \alpha_{opt}$ at maximum wind speeds



Tairfoil interaction with airflow at angles of attack in optimal working position



The constructive-kinematic scheme of the helical blade with aerodynamic profile and self-changeable angle of attack at the maximum wind speed limit (variant II: $BN_1 > BO'$)



The proposed technical solutions ensure the process of mechanical and aerodynamic braking of the rotor through relatively simple constructive solutions and at the same time ensure the tower's security from overloads generated at high wind speeds.