















The following are suggestions for further investigations based on the previous work:

1) Finding the effect upon wind turbines, wind farms or wind energy generation considering turbulent conditions when  $Rex > 5 \cdot 10^5$ .

2) Studying the effect of fluctuating wind steams on the structure of wind turbine and its base.

3) Integration of corrugated surface function through calculations can be introduced by taking different functions instead of sine functions to describe shape of obstacles such as cosine functions or any combination of both.

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## NOMENCLATURE

A	Swept rotor area in square meter	m <sup>2</sup>
a*	Amplitude-to-length ratio of the wavy surface (wave amplitude)	Dimensionless
Cp	Power Coefficient of wind turbine	Dimensionless
Hhub	Hub height of the wind turbine	M
P	Wind power in watt	W
P	Pressure anywhere in the field	N/m <sup>2</sup>
R	Radius of wind turbine blade	M
U, V	Dimensionless velocity components along the (x, y) axes	Dimensionless
X, Y	Cartesian coordinate component in the direction along and normal to the tangent of the surface	M
Ω	Rotor speed	Rad/s
β (°)	Pitch angle	Degrees (°)
Λ	Characteristic length associated with the wavy surface	M
ν	Kinematic viscosity	m <sup>2</sup> /s
'	Differentiation with respect to η	
f'	First order component of f	
F	Zeroth order component of f	
*	Dimensionless quantities	