

NOMENCLATURE

Dimensional quantities

a	rate of gravitational settling of solid (liquid) particles; sound velocity, m/s; thermal diffusivity of gas, m^2/s
A	region (zone) surface area, m^2
c_p	isobaric heat capacity of gas, J/kg·K
c_v	isochoric heat capacity of gas, J/kg·K
d	diameter of the streamlined body, m
f_1	first Coriolis parameter, s^{-1}
f_2	second Coriolis parameter, s^{-1}
\vec{F}	vector of the total mass force, N
\vec{F}_c	Coriolis force vector, N
F_x, F_y, F_z	projections of the vector of the total mass force in the Cartesian system of coordinates, N
g	acceleration of gravity, m/s^2
h	typical vertical size; model screen height; protected facility height, m
h_1	mesh structure height, m
h_2	height of the surface flow generating a vortex, m
H	vortex height, m
l	laboratory vortex height, m
l_1	fixed barrier height, m
l_2	mesh barrier height, m
l_c	Coriolis circle length, m
L	space scale, tornado height, m
L_k	propagation path length of the k intensity tornado, m
m	material point mass, kg
p	gas pressure, Pa
R	the Earth radius, m; the universal gas constant, J/(kg·K)

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R_c	Coriolis circle radius, m
r, φ, z	radial, azimuthal (tangential), and axial coordinates in the cylindrical system of coordinates, m, rad., m
S	entropy, J/K; total damage area, m ²
T	temperature of gas and underlying surface, K; effective period of observations, s
T_a	air temperature over the underlying surface, K
T_c	temperature at the center of the underlying surface, K
U	forward velocity of tornado, m/s
U_k	forward velocity of the k intensity tornado, m/s
U_p	forward velocity of the probable tornado, m/s
\vec{U}	gas velocity vector, m/s
U_r, U_φ, U_z	projections of the gas velocity vector in the cylindrical system of coordinates, m/s
U_x, U_y, U_z	projections of the gas velocity vector in the Cartesian system of coordinates, m/s
V	rotational velocity of the tornado funnel wall, m/s
V_k	rotational velocity of the k intensity tornado funnel wall, m/s
V_p	rotational velocity of the probable tornado funnel wall, m/s
\vec{V}	vector of material particle velocity, m/s
V_x, V_y, V_z	vector of material particle velocity projection in the Cartesian system of coordinates, m/s
W_k	propagation path width of the k intensity tornado, m
x, y, z	longitudinal, lateral, and vertical coordinates in the Cartesian system of coordinates, m

Greek symbols

β	coefficient of volumetric expansion, K ⁻¹
Γ	circulation, m ² /s; temperature gradient, K/m
Δp_p	pressure difference between the center of the funnel and the periphery of the probable tornado, Pa
μ	coefficient of dynamic viscosity, N·s/m ²
ν	kinematic viscosity coefficient, m ² /s
ρ	gas density, kg/m ³
ρ_p	density of solid (liquid) particles, kg/m ³
φ	geographical latitude, rad.
τ	time, s

TORNADO

τ_c	time of cooling of the underlying surface; time of motion along the Coriolis circle, s
τ_h	time of heating of the underlying surface, s
Ψ	stream function, m^3/s
$\bar{\omega}$	gas vorticity vector, s^{-1}
$\omega_r, \omega_\varphi, \omega_z$	projection of the gas vorticity vector in the cylindrical system of coordinates, s^{-1}
$\omega_x, \omega_y, \omega_z$	projection of the gas vorticity vector in the Cartesian system of coordinates, s^{-1}
Ω	vector magnitude of the angular velocity; angular rotational velocity of the Earth, s^{-1}
$\bar{\Omega}$	vector of angular rotational velocity, s^{-1}
$\Omega_x, \Omega_y, \Omega_z$	projections of the angular velocity vector in the Cartesian system of coordinates, s^{-1}

Dimensionless quantities

a	ratio of the actual number of tornados to the recorded number
k	adiabatic index; tornado intensity class
k_p	calculated intensity class of probable tornado
m_k	the highest class of recorded tornados of the class in the area
n	polytropic index; number of tornados recorded in the area
n_k	number of tornados recorded in the area, class k
N	total number of tornados crossing the area
P	annual probability of a tornado of the specific intensity class
P_0	annual probability of a tornado-like event
P_s	annual probability of a tornado-like event in the area
Ra	Rayleigh number
Re_d	Reynolds number for flow past a body
Re_r	radial Reynolds number
Re_φ	vortex Reynolds number
Ro	Rossby number
S	parameter of twisting

Greek symbols

Φ	volume concentration of solid (liquid) particles
ψ	stream function

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Subscripts

∞	value at infinity
0	value at the initial instant of time; on the ground surface; on the core boundary
c	value at the center of the underlying surface
f	value on the funnel surface
k	value for the k intensity tornado
max	maximum value
min	minimum value
p	value for the probable tornado.