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SMR/23/75

AUTUMN COURSE ON APPLICATIONS OF ANALYSIS
TO MECHANICS

22 September - 26 November 1976

DROPLET ROTATION IN PRECIPITATION PROCESSES

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Droplet rotation in precipitation processes.

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The results of evaluation of artificial modification of clouds and precipitation are rather very discouraging. All the attempts to modify the amounts of precipitation is based on the possibility that the dynamic state or the efficiency of the precipitation process may be affected by introducing substances which alter the microphysical processes in clouds. The Uncertainty is due to the fact that the consequences desired are not the primary changes in cloud structure, but instead, are indirect results of a chain of events [1,2].

The potentialities of rain making in India was examined [3]. It has been pointed out that it is difficult to assess the increase of rain due to artificial seeding in India, as the variability of the rainfall at a place is as much as 35% and on the other hand the most successful seeding experiments claim an increase in rainfall to be about 15%. Moreover, the suitable conditions for seeding in India generally exist for the summer monsoonal flow. In the paper it was suggested that the seeding techniques [illegible] in India for cloud

dissipation of the summer monsoon clouds systems that appear over river catchment areas, to avoid floods. As a waygout, the "artificial dew making" could help augmenting the water potential of a place.

The new seeding method of future, taking into consideration the existance and importance of cloud droplet rotation, is an aspect of precipitation mechanism which recognises the dynamics and microphysical processes and their strong coupling. The stochastic collision efficiency may be increased by altering the angular speeds of droplets.

Rotation of cloud droplet.

The following processes of clouds are taken note of while identifying the spin to droplets.

① Impulsive magnetic fields due to electric discharges
② The changing electric fields of the cloud.
③ electric charges on the droplets. The opposite charges exist within a given length of time.
④ changing droplet radius as a consequence of surface processes, like, evaporation, diffusion, heat exchange, condensation etc.
⑤ Micron variations in temperature and other parameters [illegible] droplet and outside.

⑥ Droplet growth by collision and coalescence

⑦ Droplet motion in a medium saturated or near saturated with water vapour.

Let the aggregate influence of all these factors on a typical spinning droplet be equipollent to a force $F(x,t)$ in the direction of its translation and a couple $G(\theta,t)$ about the axis of its rotation. The equations of motion of the droplet can now be written as

$$m\ddot{x} = F(x,t) \quad \text{—— (1)}$$

and $$I\ddot{\theta} = G(\theta,t) \quad \text{—— (2)}$$

In these equations,

m = mass of the droplet

I = its moment of inertia about the axis of rotation and

x, θ = translational and angular displacements in time t.

The complete picture of the motion can be described by the solution of the equations (1) & (2)

In particular, when F and G are independent of t, these equations reduce to

$$mv\frac{dv}{dx} = F(x) \quad \text{—— (3)}$$

and $Iw \frac{dw}{d\theta} = G(\theta)$ ——————(4)

where v stands for the translational velocity ($= \dot{x}$) and w for the angular velocity ($= \dot{\theta}$). Integrating the equations, we obtain

$$v^2 = v_0^2 + \frac{2}{m} \int_0^x F(x)\,dx \quad —(5)$$

$$w^2 = w_0^2 + \frac{2}{I} \int_0^\theta G(\theta)\,d\theta \quad —(6)$$

v_0 and w_0 being initial values of v and w.

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