

We Hear From

Anil Kumar Ghosh

Lightning Conductor

Millions of damages are caused by lightning. Laser rays can divert the lightning in computable paths and therefore protect the sensitive plants. There is no wonder that with a released lightning strike energy is so huge that it can devastate electrical plants in the neighbourhood of many kilometers. Within one tenth of a second current strength (intensity) of several thousand amperes flow. Electrical potential of few million volts and strong magnetic fields are generated.

In lightning channel the air is heated to several thousand degree and discharges with the sound of ultrasonic bang as thunder. While the electrical discharge takes the shortest route to the earth, the high rise structures are vulnerable frequently for the lightning. Very often the lightning fall upon the plants for mobile phone service, transmission plants for radio and TV and windpower plants and the flight safety plants. What exactly happens with a lightning strike and how the electronic equipment and plants are laid out safe, the research project lightning current measurement at the telecommunication tower Hohenpeißenberg in Germany should clarify. About 936 metre broadcasting tower and a research station is managed by telecom sister Deutsche Funkturn GmbH and the University of Federal Defense, Munich. At the summit of broadcasting tower the researchers have assembled a safety grip of metallic tip which should additionally attract lightning. With a high velocity camera which

can deliver 5000 photos per second and specially safeguarded measuring electronic the lightning strikes in all developments arenas are recorded. With this it turned out already discharges upto 70000 amperes as top rider.

Every lightning is different. Christian Paul, the engineer at the Institute of Electrical Energy supplier of the University of Federal Defense explores the nature of lightning and uses to that the measuring technique at the Hohenpeißenberg.

Instead of the thundercloud to the earth, the discharge takes the reversed way. Certainly in the electrically charged clouds first of all a lightning canal is build up. For the discharge however it comes first when from the peak of the broadcasting tower a catching discharge is generated contrary to the lightning canal. With the union the lightning discharges then from downwards to the upwards.

Such discharges are dreadful as these above pretty long time flow above and often do not flash. These cannot therefore also be seized through usual lightning navigation which on the other hand renders difficult the prediction and early warning. It does have a burnt smell for wind energy plants. These consist mostly of light coal fibre composite matter. While this material is a bad electrical conductor, the energy of the lightning can only flow off insufficiently in the soil. If the thunder strikes a wind wheel and it is not sufficiently secured, it burns up,

says researchers. The measurement results are therefore important for many national and international standards.

Huge devastating energy escapes from lightning current while it often consists of two completely different current components. During the so-called longtime current, it amounts to only few 100 amperes and it lasts for one-tenth of a second, shock (impulse) current accompanies it which is 100 times stronger and shorter. With that the peak value would become 200000 amperes.

For the Ariel traffic the no computability of the natural current presents problem. Statistically each aircraft is met with lightning stroke once per year. It goes mostly with big damages while modern machines are well secured against thunder strikes. However after a thunder stroke aircrafts are kept as standby and sometimes also repaired. It costs too much to the aircrafts association, says Jean-Pierre Wolf, Physicist of the University of Geneva. To bring the controlled lightning from the sky and to render safe the danger potential is

it possible? The scientist exactly researches that in the EU Project "Laser lightning red" together with partners under other European Aeroplane and Space Journey branch. Laser as lightning conductor, so the vision, the risks from thunderstroke in the neighbourhood of airport should reduce. To the researchers' experiment with special infrared laser, which attacks the thunderimpregnated cloud in extremely short pulse with energy of several terawatt.

The high energy pulse should ionize the air molecules and therefore as it were several hundred metre long conductor way (path) pre-impression along which it then comes to controlled discharge. A similar laser shield could protect the neighbourhood of airports also space stations, powerworks, computer plants against the fatal thunderstroke. The researchers want to experiment the arrangement in a first open land investigation.

*Source: VDI nachrichten,
1 June 2018, Nr 22, Forschung , Seite 15,
(Silvia von Der Weiden)*
