**Rainfall kinetic energy measurements with impactometer implementation**

**Summary**

Until now rainfall kinetic energy is not a commonly measured characteristic at the frame of precipitation phenomena monitoring. Both at home and aboard the hindrance for it arises from the lack of suitable, easy for use, credible and accessible in the view of cost measuring instruments. Review of the international solutions concerning instruments used for rainfall kinetic energy flux measurements is presented at the monograph introduction. The construction of impactometer developed at the Institute of Building and Landscape Architecture, Agricultural Academy of Wroclaw, on the basis of piezoelectric force sensor, steered by the built-in microprocessor, is presented in detail on this background. This instrument was preliminary calibrated at laboratory conditions, based on the evaluation of its response against single, artificially generated, waterdrops impingements of known diameter, falling from the heights at the range from 1 to 6 m. Theoretical equations were used for the calculation of drops fall velocities. These equations, as well as the theory of single waterdrops falling phenomena in the air, are the subjects of separate monograph subchapter. A significant limitation of accessible equations for drops of big diameters velocities calculations, implemented in the experiment, and is emphasized in it. Obtained preliminary results showed the possibility of the impactometer application for both kinetic energy, as well as momentum of falling drops measurements. Moreover, it was found that instrument response was strictly connected with the distance from drops impingement position on the sensing plate to the piezoelectric sensor. For the verification of the preliminary calibration procedure correctness it was repeated in conjunction with falling drops velocity measurement. The experiment was conducted at the Institute of Fundamental Technological Research, Polish Academy of Sciences at Warsaw and specialized high-speed digital camera was used for waterdrops falling velocities recording. The obtained results proved most of all that real waterdrops fall velocities could significantly differ from their estimates based on theoretical equations. After really measured waterdrops fall velocities were took into consideration it was found that impactometer output signal was proportional to waterdrops kinetic energy values, but not their momentum, as was assumed by the authors. Possible reasons of the observed divergences are discussed at the final part of the monograph. At the same time detail research confirmed significant influence of drops impingement position on the sensing plate for the value of signal recorded by the impactometer. Final equation of instrument calibration curve for the field applications was developed on the basis of these observations.