Study of accuracy of precipitation measurements using simulation method

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Precipitation is one of the the most important meteorological parameters describing the state of the climate and to get correct information from trends, accurate measurements of precipitation is very important.

The problem is that the precipitation measurements are affected by systematic errors leading to an underestimation of actual precipitaion which errors vary by type of precipitaion and gauge type. It is well known that the wind speed is the most important enviromental factor that contributes to the underestimation of actual precipitation, especially for solid precipitation.

To study and correct the errors of precipitation measurements there are two basic possibilities:

· Use of results and conclusion of International Precipitation Measurements Intercomparisons;

· To build standard reference gauges (DFIR, pit gauge) and make own investigation;

In 1999 at the HMS we tried to achieve own investigation and built standard reference gauges

But the cost-benefit ratio in case of snow (use of DFIR) was very bad (we had several winters without significant amount of snow, while the state of DFIR was continously falling)

Due to the problem mentioned above there was need for new approximation that was the modelling made by Budapest University of Technology and Economics, Department of Fluid Mechanics using the FLUENT 6.2 model.

The ANSYS Fluent package is featured fluid dynamics solution for modelling flow and other related physical phenomena. It provides the tools needed to describe atmospheric processes, design and optimize new equipment. The CFD package includes solvers that accurately simulate behaviour of the broad range of flows that from single-phase to multi-phase.

The questions we wanted to get answer to are as follows:

· How do the different types of gauges deform the airflow around themselves?

· Try to give quantitative estimation of wind induced error.

· How does the use of wind shield improve the accuracy of precipitation measurements?

· Try to find the source of the error that can be detected at tipping bucket raingauge in winter time because of use of heating power?

On our poster we would like to present the answers to the questions listed above.