Abstract
Hydraulic conductivity of soil in arable land is strongly dependent on agrotechnological procedures, soil compaction, plant growth etc. This contribution is focused on measurement of the unsaturated hydraulic conductivity of the topsoil using newly designed automated multipoint tension infiltrometer on two agricultural catchments Nulice and Kopanínský stream. Thirteen infiltration campaigns were carried out during three years. All tension infiltration experiments were performed using pressure head of -3 cm. Initial and saturated water contents and bulk density were measured on undisturbed samples collected during each measuring campaign. The main goal of the contribution is to describe the seasonal changes of the unsaturated hydraulic conductivity on arable land. Results show that unsaturated hydraulic conductivity was significantly affected by soil compaction. Lower unsaturated conductivity was observed in spring.

Experimental catchments

**Nulice** (Central Bohemia)
- Area: 50 ha
- Altitude: 410 m a.s.l.
- Average annual temperature: 9 °C
- Annual precipitation: 650 mm
- Land use: Arable soil
- Soil type: Cambisol
- Texture: Loamy sand
- Soil Van Genuchten model param.: $\alpha = 0.048 \text{ cm}^{-1}$; $n = 1.312$

**Kopanínský stream** (Bohemo-Moravian Highland)
- Area: 710 ha
- Altitude: 467 – 578 m a.s.l.
- Average annual temperature: 7 °C
- Annual precipitation: 665 mm
- Land use: Arable soil
- Soil type: Cambisol
- Texture: Loamy sand
- Soil Van Genuchten model param.: $\alpha = 0.043 \text{ cm}^{-1}$; $n = 1.545$

Cumulative infiltration measuring principle
The cumulative infiltration is measured via changes of buoyant force acting on the vertical bar that is immersed in water in the reservoir tube. During the infiltration, changes of buoyant force are sensed using electronic load cell to which is attached the vertical bar.

Multidisk infiltrometer (Generations I and II)
- Disk diameter is 44.5 mm
- Two independent groups of three infiltrometer modules attached to a common Mariotte’s bottle (pressure head adjustment)
- Built-in data logger, a thermometer and a high capacity battery
- Data are visualized via portable keyboard and can be uploaded to PC

Experiments
- 13 infiltration campaigns in total (i.e. 78 tension infiltrations / 70 evaluated)
- Set suction pressure head $h_0 = -3 \text{ cm}$
- Maximum $-3 \text{ cm}$ of topsoil were removed prior the infiltration
- Thin contact layer (approx. 1 mm) of dry fine quartz sand used

MultiDisk infiltrometer (Generations I and II)

![MultiDisk infiltrometer](10x2030 to 829x2428)

Cumulative infiltration measuring principle

![Cumulative infiltration measuring principle](11x267 to 491x550)

Conclusions
- **MultiDisk infiltrometer** proved to be a reliable and efficient tool for the field work
- **Relation between near-saturated hydraulic conductivity and bulk density ($\rho_d$) was observed**
- It is necessary to conduct further measurements to describe in detail temporal variations of $K_{hv}$.