SVC research school 2019

Introduction course in hydraulic design, open channel flow, 2hp

Contact person: Gunnar Hellström, LTU.

Time: 2-4 December 2019

Prerequisities: Basic knowledge in physics and mathematics.

Goal: Basic understanding of flow in open channels and tunnels.

Content:
Starting point/repetition: continuity, momentum and energy equations for pipe flow, pipe flow Reynolds number, Darcy-Weisbach friction factor, Moody diagram, hydraulic rough/smooth conditions, wall shear stress, shear velocity, etc.

Towards open channel flow: partially filled pipes, non-circular pipes, hydraulic radius and its use, hydrostatic pressure, steady flow, uniform flow, dynamic and static head (m, not J/m^3), etc.

Steady uniform flow: continuity, momentum, and energy equations for open channel flow, prismatic channel, roughness with friction factor and Manning, slope of bed, surface and energy line, hydraulic mean depth, Froude number, sub- and supercritical flow, etc.

Transitional flow: Specific energy in transitional flow, control section, critical depth, gradually varied flow, natural depth, hydraulic jump, corresponding depths, Specific force, Saint-Venant equations (definition), standard step method, etc.

Sediment transportation: bed formations, cohesive and frictional material, d_{50}, angle of response, threshold of motion, Shields diagram, fall velocity, stability to erosion of slopes, bed-load, suspended load, etc.

Laboratory work: hydraulic jumps and open channel flow.

Examination: Mandatory participation in the lectures and mandatory participation in the laboratory work.