

Scottish Hydrological Group & Scottish Hydraulics Study Group

Post Graduate Research Project Evening

University of Strathclyde – John Anderson Building Lecture Theatre JA 317

<http://www.strath.ac.uk/maps/johnandersonbuilding/>

Presentations will begin at 1830 (refreshments from 1800)

Doug Pender (Glasgow University) - Modelling Medium-term Beach Evolution

Numerical modelling of medium to long-term beach evolution has clear coastal engineering and management relevance. However, the use of process-based numerical models has inherent limitations at these time scales due to the accumulation of errors within the processes being modelled. This presentation will discuss the combination of a process-based model (XBeach) and a statistical model, for simulating storm climate, allowing modelling progression into the medium-term (annual to decadal) time scale. The statistical model produces a comprehensive synthetic storm climate, removing the limitations associated with applying benchmark (1 in N year) events. This storm time series provides the forcing conditions for XBeach to simulate storm-driven recession and post-storm recovery.

Janice Blanc (Heriot-Watt University) - Performance of Culvert Trash Screens

Restricted flows through a culvert along with the potential for blockage, increases the risk of upstream flooding. To combat this hazard, screens may be fitted at the culvert opening. However, unless well designed and maintained, these can be a hazard in themselves. Current guidelines for trash screen use focus mainly on ensuring appropriate screen area. The aim of this research is to determine the influence of aspects of screen design, other than area, on blockage potential. To meet this aim, a Froude scaled physical model is being used to investigate the influence of screen angle, bar spacing and screen location.

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James Franklin (Dundee University) - Breaking of large amplitude solitary waves

Internal solitary waves (ISWs) propagate on density interfaces; in the ocean they may travel long distances and can attain large amplitudes (up to 120m). Laboratory experiments have been conducted to investigate the breaking of ISWs. Data will be presented to show temporal and spatial structure and evolution of the billows generated in the breaking process.

Ged Mitchell (University of Abertay Dundee) - Clogging of Filtration SUDS Implications for design & operation of lateral sheet flow (over-the-top) filter drains

Particles in road runoff arise from maintenance operations, atmospheric deposition, corrosion, erosion, traffic activities etc. These particles have diameters ranging from several microns to several millimetres; with their properties ranging from quickly dissolving to insoluble. With no pre-treatment, lateral sheet flow filter drains receiving these particles can be prone to surface clogging.

Elisa Vignaga (Heriot-Watt University) - The importance of microbial biofilms in water engineering

Water Engineers fundamentally consider the reciprocal interactions between fluid dynamics, the boundary in which the fluid flows and the transport processes generating within.

Physical and mechanical interactions are well understood, yet our knowledge remains poor regarding the complex feedbacks pertaining flow-sediment with aquatic ecology. Given that all wetted surfaces become colonized by microorganisms (biofilm) in a very short amount of time, their impact of hydraulic efficiency is critical to engineering design. For example, biofilms cause: (i) biofouling of pipe surfaces to reduce conveyance; (ii) added drag to the turbines of hydroelectric power stations; (iii) increased resistance of sediment against entrainment /transport etc. Thus, the present research specifically focuses on the spatial and temporal analysis of biofilm, sediment and flow in open channel; ultimate aim is to correct current empirical equations to account for microbial interaction.

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