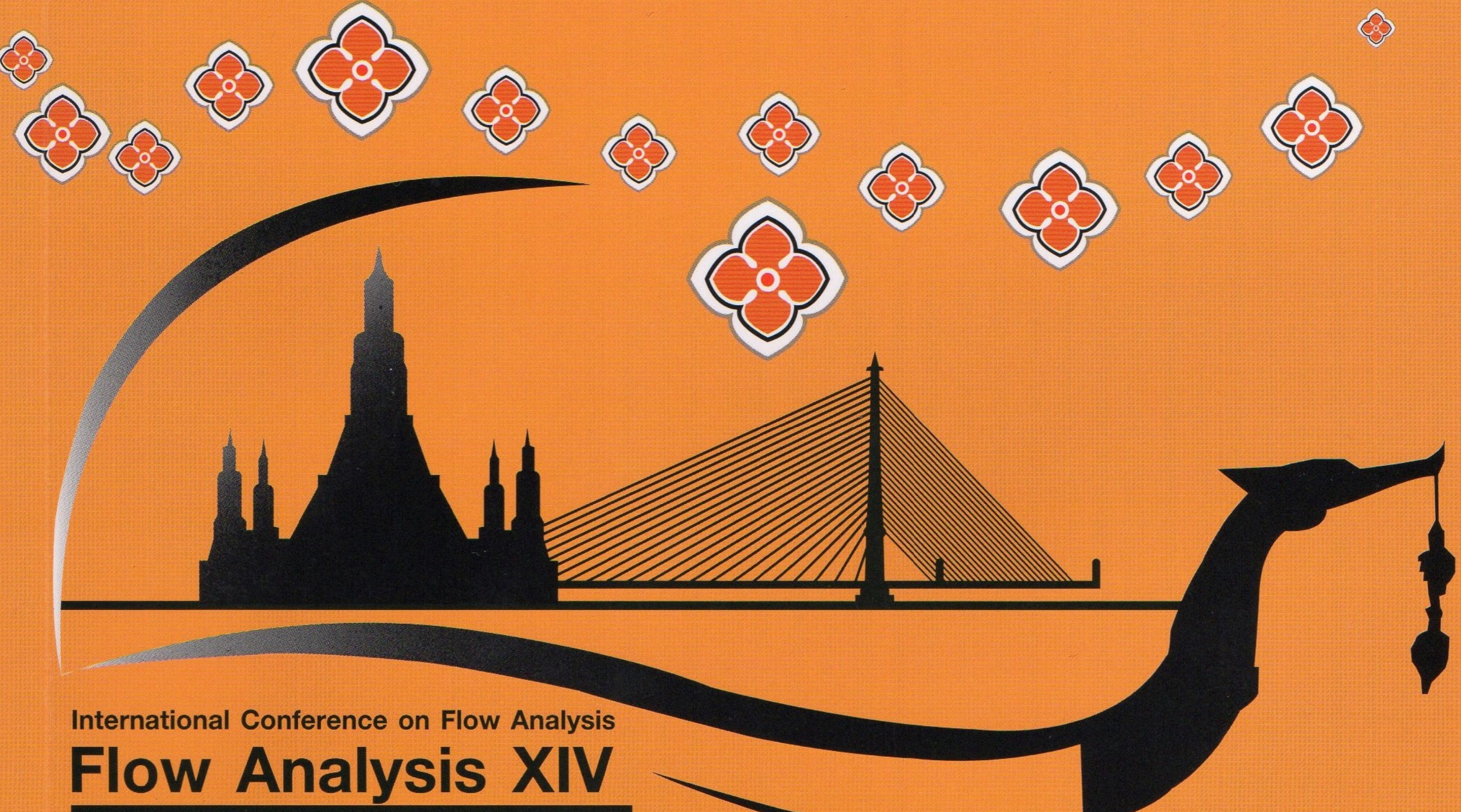
Abstract book



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Development of a flow analysis system for determination of phosphate in ground water

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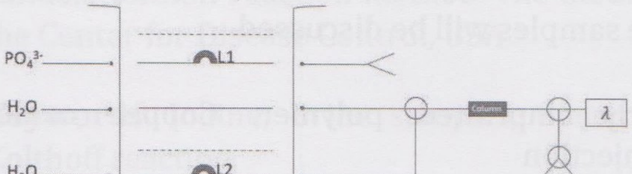
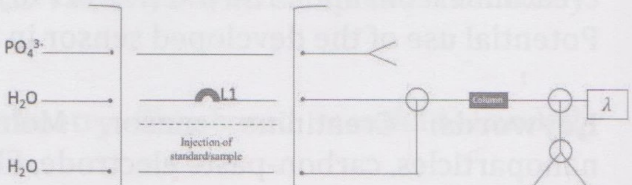
Abstract

The inorganic phosphate derived from fertilizers, intensively used in agricultural activities, is often found in excess in ground waters, leading to severe health problems. So, phosphate content is a quality factor of water quality and it is important to have an efficient monitoring of the soil leaching process. Conventional soil testing is based on soil sampling and extraction processes, which are time consuming. The aim of this work is the development of an automatic, low cost sequential injection method, capable of real-time monitoring of the soil leaching processes using spectrophotometric detection. The idea is to use a pre-concentration step, previously studied in flow injection (FI) mode, in a portable FloPro-Researcher (GlobalFIA) system with FloZF software control. Most methods for phosphate determination in water are based on the molybdenum blue chemical reaction. The FI system was developed using a commutator to study the use of the anionic resin AG1-X8 for phosphate pre-concentration. In this FI system, the resin column was loaded with 500 µL (L1) of phosphate standard and then eluted with 75 µL (L2) of a sodium chloride solution before merging with ascorbic acid (R1) and ammonium molybdate (R2) solutions.





Keywords: Flow analysis, Anionic resin, Phosphate, Soil leaching processes

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Exploring flow analysis tools for monitoring calcium and magnesium in soil leachates from laboratory scale soil columns (LSSCs)

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Abstract

Monitoring the soil/water interface has become fundamental for both environmental and agricultural studies. This work aimed to set up and monitor laboratory scale soil columns (LSSCs) using flow analysis methods for assessing nutrient levels and characterizing soil leachates. A flow analysis method was developed to determine calcium and magnesium concentrations, overcoming the disadvantages of conventional methods in terms of time consumption, waste production and cost. The LSSCs were set with soil cores from distinct locations to verify if soil type or sampling site affect leaching behaviour. Leachates were obtained through rain simulations with rain water. In order to establish valid comparisons, simulated rain was assessed before and after going through the LSSCs.
The accommodation of both metals in the same sequential injection manifold was successfully attained, as well as the determination of ranges of calcium of 0.160-8.00 mg/L and 8.00-35.0 mg/L, and a range of magnesium of 0.160-8.00 mg/L. The developed method was successfully used to monitor different soils, allowing the assessment of two distinct metal ions in samples before and after going through the LSSCs. The limit of detection obtained for calcium and magnesium determinations were 7 and 8 µg/L, respectively and the effluent production was below 2.0 mL.

Keywords: Groundwaters, Bi-parametric determination, Ca^{2+} and Mg^{2+}, Sequential injection, Soil quality

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