

XXI edition



**INTERNATIONAL CONFERENCE
"STUDENTS FOR STUDENTS"**



BOOK OF ABSTRACTS

9th- 13th of April 2025

**21st edition of the
INTERNATIONAL CONFERENCE
“STUDENTS FOR STUDENTS”**

Book of Abstracts

17th – 21st of April 2025

Preface

On behalf of Chemistry Students' Organization, in partnership with Faculty of Chemistry and Chemical Engineering from Babeş-Bolyai University Cluj-Napoca, it is our pleasure to welcome you to the XXIst edition of the INTERNATIONAL CONFERENCE "STUDENTS FOR STUDENTS" which will take place between the 9th and the 13th of April 2025.

The International Conference "*Students for Students*" is a program developed by our organization that has the aim of gathering students from all around the world offering them the chance to present their work, develop their communication skills and exchange ideas with other young researchers. We want to encourage and promote scientific research among young students and create a conducive environment where the world can benefit from their research. The program also offers a series of lectures and presentations held by important speakers from inside and outside the country, with the purpose of familiarizing the participants with the latest info on their fields of interest.

The conference is divided into 2 categories (Undergraduate and Master) and 2 sections for each category (Posters and Presentations on Chemistry, Chemical Engineering, or other sciences with applications in Chemistry and/or Chemical Engineering). The participants can choose to present their work as a poster or as an oral presentation for any of the above-mentioned sections.

This year, there are 57 students, from all around the world, that registered at our conference, with 32 posters, and 24 oral presentations, of which 20 are for chemical engineering, 30 are for chemistry and 7 are for other sciences with applications in chemistry and/or chemical engineering. We also have 3 distinguished speakers invited to present their work in the fields of chemistry and chemical engineering, that we are very thankful for accepting our invitation. We also want to thank our professors and all the people from Faculty of Chemistry and Chemical Engineering, Cluj-Napoca, for helping the organizing committee bring this project together. We are extremely grateful for all the support and very excited to experience this year's edition together.

The Organizing Committee

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 - **Denisa-Cesara ANDRONIC** - Assistant Coordinator and External Relations volunteer of the Chemistry Students' Organization
 - **Mădălin-Andrei VIZITIU** - Assistant Coordinator and Financial Department volunteer of the Chemistry Students' Organization
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 - **Conf. Dr. Eng. Julieta Daniela CHELARU** - Vice-Dean of Faculty of Chemistry and Chemical Engineering, Babeș-Bolyai University
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 - **Ec. Dr. Anca PARASCA** - Chief administrator of Faculty of Chemistry and Chemical Engineering, Babeș-Bolyai University

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The automatic control of flow rate in a river reach manipulating the upstream river reservoir discharge

Amalia-Ioana PRODAN, Lect. Dr. Eng. Elisabeta Cristina TIMIȘ, Prof. Dr. Eng. Vasile Mircea CRISTEA

Department of Chemical Engineering, Computer Aided Process Engineering Research Centre, Babeș-Bolyai University, Cluj-Napoca, Cluj, 11, Arany János Street, 400028, Romania; amalia.prodan@stud.ubbcluj.ro

This study explores the implementation of automatic control of flow rate in a river reach in Romania by manipulating the water discharge from a river reservoir. This kind of control will help reducing the potential effects of extreme low and high flows on the river ecosystem balance (e.g., jeopardizing the species diversity) and on the community (e.g., devastating flood waves). Many studies investigate automatic control systems for river reservoirs discharge focusing on gate control, spillway gate scheduling, or release rules [1, 2], while the widely employed controllers are PI (Proportional Integral), PID (Proportional Integral Derivative), LQR (Linear Quadratic Regulator), or MPC (Model Predictive Control) [3, 4].

The Florești water reservoir (1.5 km long; 10^6 m³ of water), employed for electricity production, is located in the upper-middle section of Someșul Mic River, one of the largest surface water sources in the Transylvanian Plateau. This study targets the river stretch between Gilău (the monitoring station upstream Florești reservoir) and Salatiu (97 km downstream Gilău), subjected to intense human intervention and anthropic pressure.

This case study has been implemented in MATLAB/Simulink, it involves a PI and a PID controller, and it is based on a previously developed dynamic model [5] for momentum transport along Someșul Mic River, based on the diffusive form of the Saint-Venant equations [3]. The flow sensor is placed 7.5 km downstream the Florești water reservoir (site named control point, as shown in Fig. 1), along the reach Florești - Cluj-Napoca, near a densely inhabited area, which can be easily flooded.

The system behaviour is illustrated during high flows (Fig. 2), including large peaks at the upstream locations (Fig. 2(a)). Such variability facilitates

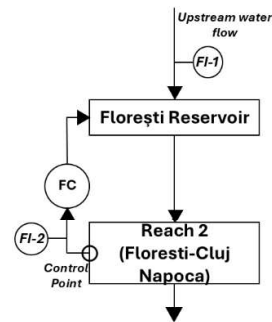


Fig. 1: Process Diagram

comparing the PI control, the PID control and the manual control (Fig. 2(b and c)). PI and PID controllers act on the reservoir's spillways opening, changing the discharged flow rate, to minimize the error between the flow rate setpoint and the measured flow rate at the control point. During manual control the spillway opening depends on the water level in the reservoir and not on the flow rate in the river. The spillways will open gradually as function of the water level in the reservoir, until the maximum value of 5.5 m is reached.

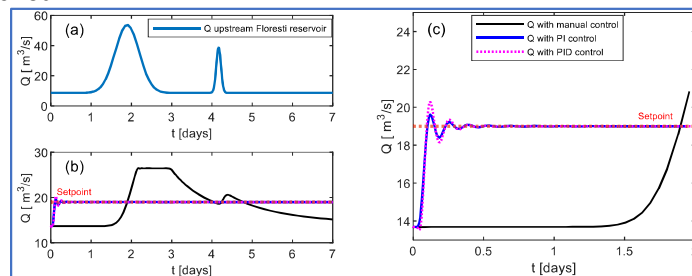


Fig. 2: Flow rate (Q) dynamics during high flows: subplot (a) upstream Florești reservoir; (b) at the control point; (c) at the control point during the first 2 days.

In the case of manual control, the peak flow rates are diminished but the flow rate still reaches values over $20 \text{ m}^3/\text{s}$, when at the control point water flows overbank. The PI and PID controllers maintain the flow rate at the setpoint after a relatively short transient regime of 12 hours, exhibiting good performance. Consequently, floods are totally avoided using the PI controller (Fig. 2(b) and (c)), while there is a single occasion in which the PID controller allows flows over the threshold during the transient regime. Consequently, further work may focus on the PID controller fine tuning and on the implementation of an additional fuzzy inference system aimed to provide the PI and PID controllers a variable reference, depending on the environmental conditions, upstream water flow regime and system status.

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- [1] Su C., (...), Wu Z., *J. Hydrol.*, **2022**, 613, 128483.
- [2] Mo C., (...), Xing Z., *Sustainability*, **2023**, 15, 11530.
- [3] Hoa P.T., (...), Agachi P.S., *Environ. Eng. and Manag. J.*, **2017**, 16, 3, 587-595.
- [4] Chiang P.K., Willems P., *Water Res. Manag.*, **2015**, 29, 2527-2542.
- [5] Prodan A.I., (...), Cristea V.M., *International Conference Students for Students XXth Edition*, Cluj-Napoca, 17-21 April 2024, **2024**, 36, pp. 15-16.