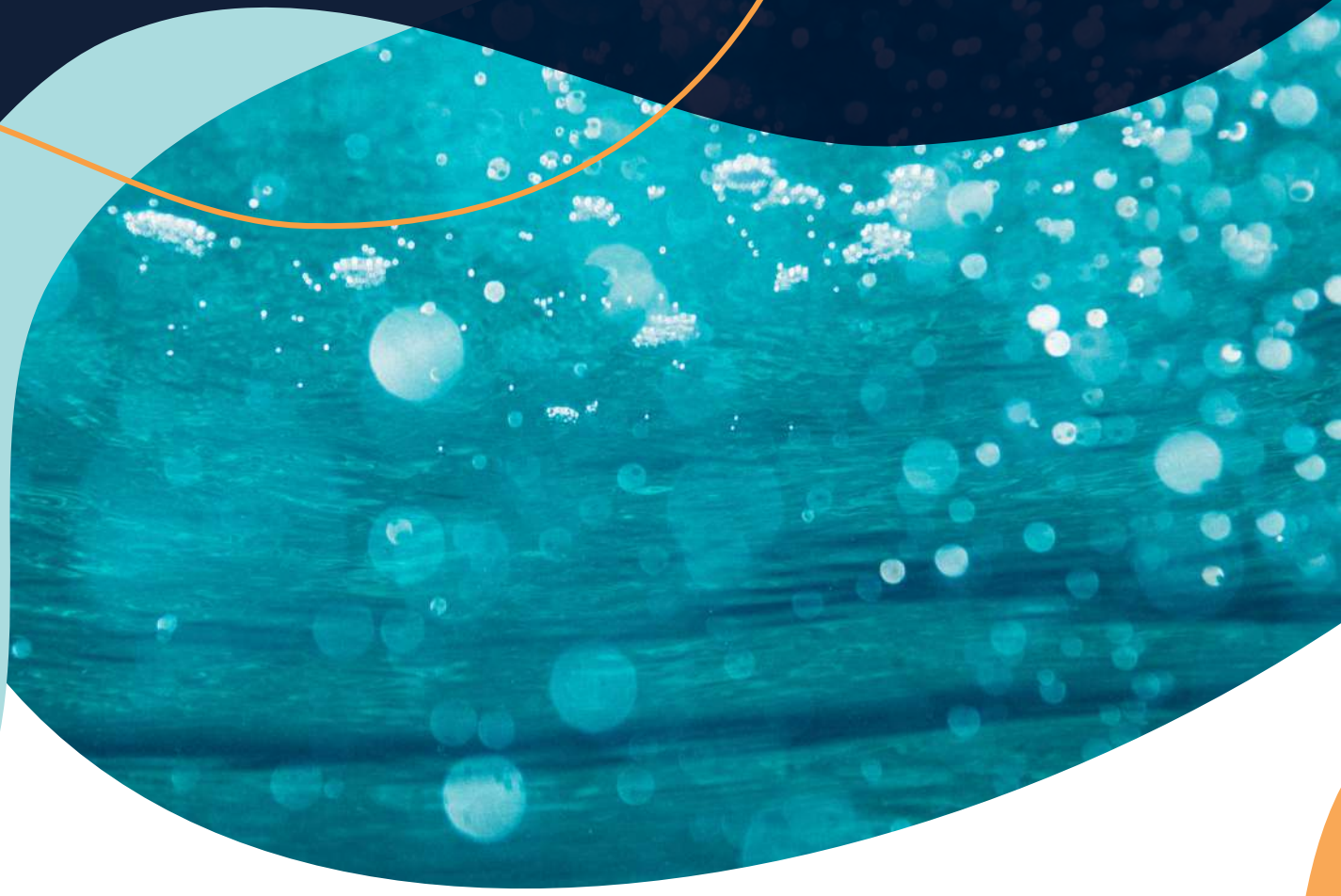
Politecnico di Torino

Department of Environment, Land and Infrastructure Engineering



MONITORING MEMBRANE FILTRATION TOWARDS PROCESS OPTIMIZATION. MEMBRANE PERFORMANCE, WATER REUSE AND RESOURCE RECOVERY

Dr. Luca Fortunato

July 20th, 2022, from 10.00 a.m.

Politecnico di Torino - Corso Duca degli Abruzzi 24
Conference Room 1° Floor - DIATI Door 3

Registration form:
https://forms.office.com/r/ML7V5bpYhr

Wearing masks still reccomended

DR. LUCA FORTUNATO

Short Bio:

Dr. Luca Fortunato is a Research Scientist at the Water Desalination (WDRC) and Reuse Center of the King Abdullah University of Science and Technology (KAUST) in Saudi Arabia. He also has five years of experience in the Water Industry, with R&D and consulting expertise in the areas of wastewater treatment and resource recovery. Dr. Fortunato's research is centered on reducing the energy demand and the environmental impact of water treatment processes. He has advanced experience in processes for the treatment of different liquid streams: desalination, wastewater, drinking water, and industrial wastewater. He is an expert on the understanding and the control of the fouling in membrane filtration processes. During his career, he has developed a new approach to monitor fouling in membrane filtration systems using in-situ non-invasive techniques. He became one of the main experts in the application of in-situ non-invasive techniques for monitoring the fouling in membrane systems. The approach was successfully applied to different membrane-based water treatment processes.

ABSTRACT

Membrane technologies play a key role for reclaiming water from different wastewater streams for reuse applications. In this context, fouling represents one of the major drawbacks of membrane systems, leading over time to the decline in membrane process performance. The present work shows the application of online fouling monitoring in membrane processes for water treatment applications. The in-situ non-destructive monitoring was performed by using Optical Coherence Tomography (OCT). The in-situ monitoring was applied to different systems and configurations: reverse osmosis membrane for drinking water production, membrane bioreactors for wastewater reuse and membrane distillation for industrial wastewater treatment. The proposed approach allows acquiring on-line information about the fouling deposited on the membrane surface without interrupting the operation.

In reverse osmosis membrane, the approach enabled monitoring of the (bio)fouling formation, acting as an early warning system for seawater desalination. In the membrane bioreactor for wastewater treatment, the OCT allowed studying the dynamic evolution of the biofouling layer under continuous operation, highlighting the potential of controlling membrane biofilm development to promote better water quality. In membrane distillation, the OCT was used to evaluate the process efficiency in the treatment of industrial wastewater for water and resource recovery, with a focus on zero liquid discharge. In summary, in-situ non-destructive monitoring advanced the understanding of membrane filtration processes with the potential of reducing the energy demand and the environmental impact of membrane-based water treatment processes.