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TURBULENT FLOW CHARACTERIZATION IN A CONTACT CHAMBER OF A WASTEWATER TREATMENT PLANT WITH LS-PIV TECHNIQUE AND CFD MODELS

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Abstract. The Costa Azul wastewater treatment plant is situated in Carlos Paz city (Córdoba, Argentina). After treatment, the effluent is discharged into the San Roque reservoir, which is the source of supply water for Córdoba city and surrounding towns. Currently, the wastewater treatment plant (WWTP) lacks an accurate flow monitoring system at the last treatment: disinfection. In this work, experimental in-situ technique and computational fluid dynamics (CFD) were applied, in a combined way, to characterize the turbulent flow in the contact chamber. First, Large Scale Particle Image Velocimetry (LS-PIV) was applied. The results made it possible to obtain characteristic parameters of the average flow: cross-sectional velocity profiles, recirculation and flow stagnation zones, flow discharge and characteristic parameters of the contact chamber. Second, numerical models, based on the Reynolds-average Navier–Stokes equations with the k–ϵ turbulent closure model were used. Based on the simulations results, it was possible to calibrate the discharge equation for a rectangular weir, and elaborate recommendations to improve the discharge measurement system and hydraulics in the area of the contact chamber curves.