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Electrical resistivity tomography used to characterize bubble distribution in complex aerated reactors: development of the method and application to a semi-industrial MBR in operation

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Highlights

- A numerical procedure is proposed to define ERT methodology for reactors with complex geometry
- ERT was used to study the gas phase distribution in an aerated plant scale-MBR filled with activated sludge
- ERT is adapted to bubble dispersion characterization in membrane modules with activated sludge
- The bubble dispersion over the membrane module surface depends on the air flow and MLSS concentration

Abstract

Membrane bioreactors (MBRs) are widely used in wastewater treatment processes. However, membrane fouling mitigation remains challenging. Several strategies have been developed industrially to enhance MBR productivity, including coarse bubble aeration. The way such aeration participates in hydrodynamic patterns is an important research topic given its major contribution to the energy costs of such facilities. The methods currently used for hydrodynamic characterization suffer from several drawbacks, mainly due to the system's complexity. Consequently, there is a need for a nonintrusive method that could be employed in reactors with complex internal geometry and in the presence of activated sludge.