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Epstein-Plesset theory based measurements of concentration of nitrogen gases dissolved in aerated water MASASHI SASAKI, TATSUYA YAMASHITA, KEITA ANDO, Department of Mechanical Engineering, Keio University — Microbubble aeration is used to dissolved gases into water and is an important technique in agriculture and industry. We can measure concentration of dissolved oxygen (DO) in aerated water by commercial DO meters. However, there do not exist commercially available techniques to measure concentration to dissolved nitrogen (DN). In the present study, we propose the method to measure DN in aerated water with the aid of Epstein-Plesset-type analysis. Gas-supersaturated tap water is produced by applying aeration with micro-sized air bubbles and is then stored in a glass container open to the atmosphere. Diffusion-driven growth of bubbles nucleated at the container surface is recorded with a video camera. The bubble growth rate is compare to the extended Epstein-Plesset theory that models mass transfer of both DO and DN into the surface-attached bubbles base on the diffusion equation. Given the DO measurements, we can obtain the DN level by fitting in the comparison.

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