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Study on Dissolved Oxygen and Water Quality Using Physical Continuity Equations and Computational Simulations RICHARD KYUNG, JENNA RYU, Choice Research Group — In order to protect the survival of aquatic life, there must be a minimum amount of dissolved oxygen present in. As the physical and biological degradation continues, the biological oxygen demand increases, resulting in the decrease in dissolved oxygen available in the aquatic environment. In order to restore balance, the process of reaeration occurs, in which oxygen is added to the decreased amount of dissolved oxygen. To analyze the balance and degradation, the physical continuity equation, a one-dimensional model of oxygen concentration in a fixed control volume, is crucial to understand. The equation is based on mass flow rate balance, which is affected by oxygen removal from water through degradation of organic materials, as well as reaeration through the transfer of oxygen from the atmosphere and into the water. In this paper, dissolved oxygen(DO) and biological oxygen demand(BOD) were calculated for various water bodies including ponds, sluggish streams, and swift streams. For all water bodies, DO was depleted faster than it was replenished, but the DO of the stream dropped until the rate of deoxygenation became the same as the rate of reaeration. Depending on the range of the reaeration constants, the DO and BOD of the bodies converge to equilibrium in different ways.

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