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History effects on the gas exchange between a bubble and a liquid[1] SHIGAN CHU, Johns Hopkins University, ANDREA PROSPERETTI[2], University of Houston — History effects are a distinctive feature of diffusive processes. For a diffusing gas bubble at rest in a liquid, such effects arise when the concentration of dissolved gas at the bubble surface, connected to the gas pressure by Henrys law, depends on time. This time dependence can be caused by several factors, such as varying ambient pressure, mole fraction in a multicomponent gas bubble, surface tension and others. In this study we consider history effects in the three situations mentioned above. More specifically, rectified diffusion in an oscillating ambient pressure field is explored under conditions when the diffusion length is larger than the bubble radius. History effects are found to be important in determining the threshold conditions for rectified diffusion. In contrast, history effects are small in the other two cases.

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