# Estimation of Diffusivity of Phycobilins in Thylakoid Lumen by FRAP Imaging Technique

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March 15, 2011

The determination of phycobilins diffusivity (diffusion coefficient $D$) in thylakoid lumen from fluorescence recovery after photobleaching (FRAP) experiments was usually done by analytical models. However, the analytical models needs some unrealistic conditions to be supposed. This study describes the development and validation of a method based on finite difference simulation of diffusion process and on the minimizing of an objective function representing the disparity between the experimental and simulated time-varying concentration profiles. Our method improves on other models by accounting for experimentally measured two dimensional post-bleaching fluorescence profiles and time-varying boundary conditions, and can includes the time varying fluorescence signal and a reaction term as well. As a result we obtain both the overall diffusion coefficient $D$ and the diffusivities $D_j$ based on two successive fluorescence profiles in *j-th* time interval. This approach discovers new insight in FRAP data and demonstrates the advantages of our method over common analytical approaches.

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