Re-fluorescence in One-Dimension

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The fluorescence of a molecule vs. concentration is generally described by applying Beer's law to the incident light and determining the amount of energy absorbed by the molecule. This simplification produces a function that is roughly linear at low concentrations, and then reaches a maximum. However, experimentally it has been shown that as concentration increases further, the fluorescence begins to decrease. This is caused by effects such as internal filtering, scatter, and re-fluorescence. Re-fluorescence occurs when the emission and excitation spectra overlap. This study attempts to model the re-fluorescence in linear systems. By applying Beer's law to both the incident light and the fluorescence, a function describing the amount of light within the cuvette was obtained. The fluorescence of the solution was then solved from this function. The model exhibits an initial linear increase of fluorescence as concentration increases followed by an eventual peaking and fall as internal filtering begins to take effect.