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Understanding the modulation frequency dependence of continuous wave optically/electrically detected magnetic resonance SANG-YUN LEE, SEOYOUNG PAIK, DANE R. MCCAMEY, CHRISTOPH BOEHME, Department of Physics and Astronomy, University of Utah — Continuous wave optically and electrically detected magnetic resonance spectroscopy (cwODMR/cwEDMR) are powerful methods which allow the investigation of the microscopic nature of paramagnetic states involved in spin-dependent transitions, like recombination and transport. Although experimentally similar to conventional electron spin resonance (ESR), there exist limitations when applying conventional theoretical models originally developed for ESR to explain how the observables (luminescence and electric current) of cwODMR and cwEDMR behave under the influences of various experimental parameters. Here we present closed-form solutions for the modulation frequency dependence of cwODMR and cw EDMR based on an intermediate pair recombination model [1] and discuss ambiguities which arise when attempting to distinguishing the dominant spin-dependent processes underlying experimental data. These include: 1) a large number of quantitatively different models cannot be differentiated, 2) signs of signal are determined not only by recombination, but also by other processes like dissociation, intersystem-crossing, pair generation, and even an experimental parameter, modulation frequency.
[1] D. Kaplan, I. Solomon, and N. Mott, Journal de Physique Lettres 39, 51 (1978).

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