Fitting light saturation curves measured using PAM fluorometry

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Blue diode PAM (P ulse A mplitude M odulation) fluorometry was used to measure photosynthesis in *Synechococcus* (classical Cyanobacteria), *Prochlorothrix* (Prochlorophyta), *Chlorella* (Chlorophyta), *Rhodomonas* (Cryptophyte), *Phaeodactylum* (Bacillariophyta) and *Acaryochloris* (Chl d/a cyanobacteria). Effective quantum yield (F_v) *vs.* irradiance (E) curves could be described by a simple exponential decay function ($F_v = F_{vmax}e^{-kE}$) although Log/Log transformation was sometimes found to be necessary to obtain the best fits. Photosynthesis (P) was measured as Electron Transport Rate (ETR) standardised on a chlorophyll basis. P *vs.* E curves were fitted to the waiting-in-line function (an equation of the form $P = P_{max}$•k•I•e^{-kE}) allowing 1/2 saturating and optimal irradiances to be estimated. At twice optimal light intensities there is 26.4% photoinhibition of P_{max} and is the irradiance at which all PSII would be "closed". The waiting-in-line model was found to be a very good descriptor of photosynthetic light saturation curves and superior to hyperbolic functions with an asymptotic saturation point (Michaelis-Menten, exponential saturation and hyperbolic tangent). The exponential constants (k) of the Y_v *vs* E and P *vs.* E curves should be equal because ETR is directly proportional to $Y_v \times E$. Non-Photochemical Quenching (NPQ) in *Synechococcus* was not significantly different to zero but NPQ *vs* E curves for the other algae could be fitted to an exponential saturation model.