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Asymptotic analysis of collision-induced timing shifts in return-to-zero quasi-linear systems with pre- and post-dispersion compensation

An asymptotic method for calculating the collision-induced frequency and timing shifts for quasi-linear pulses in return-to-zero, wavelength-division multiplexed systems with pre- and post-dispersion compensation will be presented. Predictions of the asymptotic theory will be shown to agree well with a priori quadratures and direct numerical simulations. Using this theory computational savings of many orders of magnitude can be realized over direct numerical simulations.