Resonant driving of two-level system

Input energy splitting and coupling $\omega_{kl} := 0$ $V := 1$

Rabi frequency:

$$\Omega(\omega) := \frac{1}{2}\cdot\left[\sqrt{V^2 + (\omega_{kl} - \omega)^2}\right]$$

Probability of transfer from intial state (l) to final state (k)

$$P(t,\omega) := \frac{V^2}{V^2 + (\omega_{kl} - \omega)^2}\cdot\sin(\Omega(\omega)\cdot t)^2$$

Time axis: $i := 0 .. 500$ $\tau_i := \frac{i}{50}$

Evalulate time-dependence for four values of the detuning ω_{kl}-ω.

$n := 0 .. 3$

Detuning : $\Delta_n := \omega_n - \omega_{kl}$

$\omega_n :=$

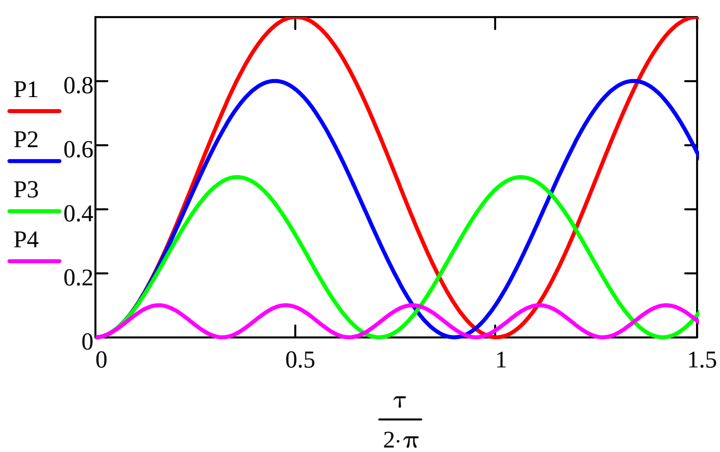
0
0.5
1
3

$$\Delta = \begin{pmatrix} 0 \\ 0.5 \\ 1 \\ 3 \end{pmatrix}$$

Here the units of detuning should be measured with respect to the coupling:

$$\frac{\Delta}{V} = \begin{pmatrix} 0 \\ 0.5 \\ 1 \\ 3 \end{pmatrix}$$

$P1_i := P(\tau_i, \omega_0)$ $P2_i := P(\tau_i, \omega_1)$ $P3_i := P(\tau_i, \omega_2)$ $P4_i := P(\tau_i, \omega_3)$



Now investigate the detuning dependence of the transfer probability as a function of time.

$j := 0 .. 200$

$\omega_j := \frac{100 - j}{10}$

$t_n :=$

1
2.5
5
7.5

$P_{max}(\omega) := \left[\frac{V^2}{\left[V^2 + (\omega_{kl} - \omega)^2\right]}\right]$

$P1_j := P(t_0, \omega_j)$ $P2_j := P(t_1, \omega_j)$ $P3_j := P(t_2, \omega_j)$ $P4_j := P(t_3, \omega_j)$