TABLE 13.2 Transition probabilities for time-dependent perturbations

1. $H^*$ is separable: $H^*(t, \tau) = \lim_{f \to 0} H(t + \tau) / f(t + \tau)$

<table>
<thead>
<tr>
<th>$P_{\tau}$</th>
<th>$P_{\omega}$</th>
<th>$P_{\omega'}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\left( \frac{\pi}{\omega} \right)^2$</td>
<td>$4\pi^2$</td>
<td>$\frac{\pi}{\omega}$</td>
</tr>
</tbody>
</table>

Harmonic perturbation $f = 2 \cos \omega t$, turned on at $t = 0$.

$P_{\omega} = \frac{|h|}{(\hbar \omega + 1/2)^2}$ sin$^2 (\omega \tau + \pi/2)$

Long-time or high-frequency limit: $P_{\omega} = \frac{2\pi}{h} \delta(\omega + \omega')$

Probability for transition to a band centered at $E_0$, with $g |H^*|$ slowly varying in energy:

$P_{\omega} = \frac{2\pi}{h} / (\omega' + \omega')$

2. $\hat{H}^*$ is slowly changing

The above results for $P_{\omega}$ apply in the initial state $|\psi_0\>$.

Additional theorem:

$P_{\omega} = 0$ (i.e., $|\psi_0\>$ no mixing)