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Semiclassical time-independent description of rapidly oscillating fields on a lattice in the Kapitza approximation. JEAN-PIERRE GALLINAR, Depto. de Fisica, Universidad Simon Bolivar, Aptdo. 89000, Caracas 1080A, Venezuela — We investigate a semiclassical dynamics driven by a high-frequency (ω) field, plus a static arbitrary potential on a one-dimensional tight-binding lattice. We find -in the spirit of the Kapitza pendulum- an effective, time-independent potential $V_{eff}(x)$ that describes the average motion to order ω^{-2}. This effective potential depends on the static external potential $V(x)$, on the lattice constant "a" and on the applied high-frequency field $f(x,t)$. One obtains that

$$\frac{V_{eff}(x)}{m} = \frac{a^2}{2}V^2(x) - a^2 EV(x) + a^4 \int dx (V(x) - E)^2 \frac{\partial}{\partial x}\left[\sum_{n=1}^{\infty} \frac{f_n^2(x)}{\omega^2 n^2}\right].$$

Where "m" and "E" are, respectively, the effective mass and unperturbed energy of the particle's average motion, and $f_n(x)$ is the n-th Fourier component of the driving field. Where appropriate, our results should be suitable for the description of semiclassical electronic motion in a crystal lattice and/or atomic motion in an optical one.

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