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Phasor-like interpretation of tight-binding electronic motion in the single-band approximation JEAN-PIERRE GALLINAR, Departamento de Física, Universidad Simón Bolívar, Apartado 89000, Caracas 1080-A, Venezuela — We present a specific interpretation of a previously derived [1] pseudo-spectral method for studying electronic wave-packet evolution within the single-band approximation. As a result of analytical properties of Bessel functions, it is shown that in a homogeneous time-dependent electric field an electron's motion in a one-dimensional nearest-neighbor tight-binding band can be described in terms of a phasor (polygonal) construction in the complex plane. Based upon our polygonal construction, an analogy is established between motion in a constant or in a linearly time-dependent electric field and the optical phenomena of Fraunhofer or Fresnel diffraction, respectively. The first type of diffraction, associated to the figure of a circumference, leads to the usual Bloch oscillation effect. The second one leads to asymptotic localization due to the mathematical properties of the Cornu spiral. Finally, a phasor-like formula for inhomogeneous electric fields, general band structure and dimensionality of electronic motion is presented in terms of a multidimensional integral of appropriate discrete Fourier transforms of the applied external potential. [1] D. Sanjinés and J.-P. Gallinar, Phys. Rev. **B64**, 054301 (2001).

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