

Discrete time-dependent wave equations I. Semiclassical analysis

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In this paper we consider a semiclassical version of the wave equations with singular Hölder time-dependent propagation speeds on the lattice $\hbar\mathbb{Z}^n$. We allow the propagation speed to vanish leading to the weakly hyperbolic nature of the equations. Curiously, very much contrary to the Euclidean case considered by Colombini, de Giorgi and Spagnolo and by other authors, the Cauchy problem in this case is well-posed in $\ell^2(\hbar\mathbb{Z}^n)$. However, we also recover the well-posedness results in the intersection of certain Gevrey and Sobolev spaces in the limit of the semiclassical parameter $\hbar \rightarrow 0$.