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On the Asymptotics of Fourier Coefficients for the Potential in Hill's Equation

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Abstract: We consider Hill's equation $y'' +(\bullet -q)y=0$ where $q\in L^1[0,\pi]$. We show that if l_n-the length of the n-th instability interval- is of order $O(n^{-k})$ then the real Fourier coefficients a_n,b_n of q are of the same order for(k=1,2,3), which in turn implies that $q^{(k-2)}$, the (k-2)th derivative of q, is absolutely continuous almost everywhere for k=2,3.