New super-quadratic conditions for asymptotically periodic Schrödinger equation
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Abstract. This paper is dedicated to studying the semilinear Schrödinger equation

\[
\begin{cases}
- \Delta u + V(x)u = f(x, u), & x \in \mathbb{R}^N, \\
u \in H^1(\mathbb{R}^N),
\end{cases}
\]

where \( f \) is a superlinear, subcritical nonlinearity. It focuses on the case where \( V(x) = V_0(x) + V_1(x) \), \( V_0 \in C(\mathbb{R}^N) \), \( V_0(x) \) is 1-periodic in each of \( x_1, x_2, \ldots, x_N \) and \( \sup[\sigma(-\Delta + V_0) \cap (-\infty, 0)] < 0 < \inf[\sigma(-\Delta + V_0) \cap (0, \infty)] \), \( V_1 \in C(\mathbb{R}^N) \) and \( \lim_{|x| \to \infty} V_1(x) = 0 \). A new super-quadratic condition is obtained, which is weaker than some well known results.