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Multiple positive or sign-changing solutions for a type of nonlinear Schrödinger equation

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Abstract. This paper is concerned with the existence of multiple non-radial positive solutions for

$$\begin{cases} -\Delta u + (1+\beta V(y))u = |u|^{p-2}u & y \in \mathbb{R}^N \\ u(y) \to 0 & \text{as } |y| \to +\infty \end{cases}$$

where $2 < p < 2^*$, $2^* = \frac{2N}{N-2}$ for $N > 2$ and $2^* = +\infty$ for $N = 2$, β can be regarded as a parameter and $V(|y|) > 0$ decays exponentially to zero at infinity. We prove that, for any positive integer $k > 1$, there exists a suitable range of β such that the above problem has a non-radial positive solution with exactly k maximum points which tending to infinity as $\beta \to +\infty$ (or 0^+).

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