Existence of multi-bump solutions for a system with critical exponent in $\mathbb{R}^N$.

Summary: We consider the following system with critical exponent in $\mathbb{R}^N$:

\[
\begin{align*}
-\Delta u &= K_1(y)u^{2^*-1} + \frac{p}{2^*} V(y)u^{p-1}v^q \quad \text{in } \mathbb{R}^N, \\
-\Delta v &= K_2(y)v^{2^*-1} + \frac{q}{2^*} V(y)u^{p}v^{q-1} \quad \text{in } \mathbb{R}^N, \\
u, v > 0, y \in \mathbb{R}^N,
\end{align*}
\]

where $N \geq 5$, $p, q > 1$ and $p + q = 2^* = \frac{2N}{N-2}$. Using finite dimensional reduction method, we prove the existence of multi-bump solutions. Their bumps can be placed on arbitrarily many or even infinitely many lattice points in $\mathbb{R}^N$. Since $p < 2$ or $q < 2$, we introduce two new norms to avoid singularity.

MSC:
- 35Jxx Elliptic equations and elliptic systems
- 35Bxx Qualitative properties of solutions to partial differential equations
- 53Cxx Global differential geometry

Keywords:
- elliptic system; critical exponent; finite dimensional reduction; multi-bump solutions

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