1113-35-148  Alfonso Castro* (castro@g.hmc.edu), Mathematics, Harvey Mudd College, Claremont, CA 91711, and Ivan Ventura. Existence of augmented Morse index 3 solution for a semilinear boundary value problem. Preliminary report.

Let $\Omega$ be a bounded region in $\mathbb{R}^N$. Let $f : \mathbb{R} \to \mathbb{R}$ be a differentiable function such that $f(0) = f'(0) = 0$, $f'(t) > f(t)/t$ for $t \neq 0$, and there exists $A > 0$ and $p \in (1, (N + 2)/(N - 2))$ such that $|f'(t)| \leq A(|t|^p + 1)$ for all $t \in \mathbb{R}$. The boundary value problem $\Delta u + f(u) = 0$ in $\Omega$, $u = 0$ on the boundary of $\Omega$ has two Morse index 1 solutions and a Morse index 2 solution that changes sign exactly once. We prove that when a sublevel of the functional $J(u) = \int_{\Omega} \|\nabla u\|^2 - 2F(u)\,dx$, $F(u) = \int_0^u f(s)\,ds$, on the equator of the Nehari Manifold has nontrivial topology, an augmented Morse index 3 solutions exists. We provide examples of regions $\Omega$ for which this assumption applies. (Received August 18, 2015)