M. NIKSIRAT, University of Toronto

On the existence of periodic solutions to nonlinear evolution equations

Let $\Omega \subset \mathbb{R}^n$ be an open bounded set and $T > 0$. We are concern with the existence of periodic solutions to the evolution equation

$$\begin{cases} \partial_t u + f(t, x, D^{\leq 2} u) = 0 \\ u(0) = u(T) \end{cases},$$

where $x \in \Omega$ and f is T-periodic with respect to t and is uniformly elliptic. This means

$$f(t + T, x, D^{\leq 2} u) = f(t, x, D^{\leq 2} u),$$

and

$$\sum_{|\alpha|=2} f_\alpha(t, x, D^{\leq 2} u) \xi^\alpha \geqq \theta |\xi|^2$$

for some $\theta > 0$ and any $\xi \in \mathbb{R}^n - \{0\}$. Letting $u : [0, T] \to X$ where $X = H^{2+n_0}(\Omega) \cap H_0^1(\Omega)$ for $n_0 = \left[\frac{n}{2}\right] + 1$, we generalize the Skrypnik's degree for fully nonlinear elliptic maps of the form $f(x, D^{\leq 2} u)$ to one-parameter family of maps of the form $f(t, x, D^{\leq 2} u)$ and then use the Browder's degree for maps of the form $A = T + \varphi$, where T is a maximal monotone map and φ is a $(S)_+$ map to establish conditions for the existence of a periodic solution to fully nonlinear evolution equations.