Olga Rudakova (Institute of Applied Mathematics and Mechanics of National Academy of Sciences of Ukraine, Donetsk, Ukraine)

Variational problems with degeneration and non-regular unilateral obstacles in variable domains

We consider a sequence of integral functionals defined on Sobolev spaces. The spaces are associated with a weighted function and a sequence of domains Ω_s contained in a bounded domain Ω of R^n. For the given functionals we study variational problems with constraint sets of the kind $h(x, v(x)) \leq 0$ a.e. in Ω_s, where $h : \Omega \times R \to R$. Our main result provides conditions under which solutions of the variational problems under investigation converge in a certain weak sense to a solution of a limit variational problem with the set of constraints defined by the same function h. At the same time we show that constraint sets under consideration are represented as sets with unilateral obstacles, and generally speaking these obstacles do not lie in Sobolev spaces. We note that the statement of our main result requires the strong connectedness of the weighted Sobolev spaces, Γ-convergence of functionals and contains the following "exhaustion" condition on the domains Ω_s: for every increasing sequence $\{m_j\} \subset N$, $\operatorname{meas}(\Omega \setminus \bigcup_j \Omega_{m_j}) = 0$, and in general this condition cannot be omitted. We also remark that the same "exhaustion" condition has already been used in [1] for the study of both a convergence of sets of variable Sobolev spaces and the coercivity of the Γ-limit of functionals defined on these spaces.

This is a joint work with A.A. Kovalevsky.

[1] Kovalevskii A.A. On the connectedness of subsets of Sobolev spaces and the Γ-convergence of functionals with varying domain of definition // Nelinejnye granichnye zadachi. — 1989. — **1**. —P. 48–54.