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On the regularity of the free boundary for parabolic obstacle problem.

Abstract: The joint results by D.Apushkinskaya, H.Shahgholian and the author will be discussed. The regularity properties of solutions to a parabolic problem with zero constraint were studied. No a'priori information about the sign of time-derivative $\partial_t u$ of a solution u and about the free boundary $\Gamma(u)$ were assumed. It is proved that near the fixed boundary S, where u satisfies zero Dirichlet condition, $\partial_t u$ is Holder continuous and the boundary of the non-coincidence set $u > 0$ is a graph of a Lipschitz function. Besides, at contact points $(x, t) \in S \cap \Gamma(u)$ the free boudary is C^1 smooth in space directions and it can intersect S transversally in time direction.