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**Can the chiral quark soliton model describe the exotic baryon state?** YOICHI OHNISHI, MASASHI WAKAMATSU, Osaka University — We study the internal quark structure of the exotic baryon state $\Theta^+$ on the basis of an effective quark model, i.e. the SU(3) chiral quark soliton model, which has an intimate connection with the SU(3) Skyrme model. The model contains only one parameter, the dynamical quark mass $M$ which plays the role of the coupling constant between the quark fields and the chiral fields, i.e. the (composite) pions. We evaluate the distribution functions of the $\bar{s}$-quark as well as the $s$-quark in the $\Theta^+$ as a function of $M$. It turned out that the distribution of $\bar{s}$-quark has no valence-like structure and it is peaked around $x = 0$. On the other hand, the $s$-quark distribution is found to violate the positivity bound in an intorelable way for the physically reasonable value of $M$ around 350 MeV. The positivity of the $s$-quark distribution in the $\Theta^+$ is restored only for unrealistically large values of $M$ around 750 MeV, close to the strong coupling limit. This analysis throws a little doubts on the validity of the chiral soliton pictures of the exotic Penta-quark baryons in contrast to the ordinary nonexotic baryons like the octet and decuplet baryons.

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