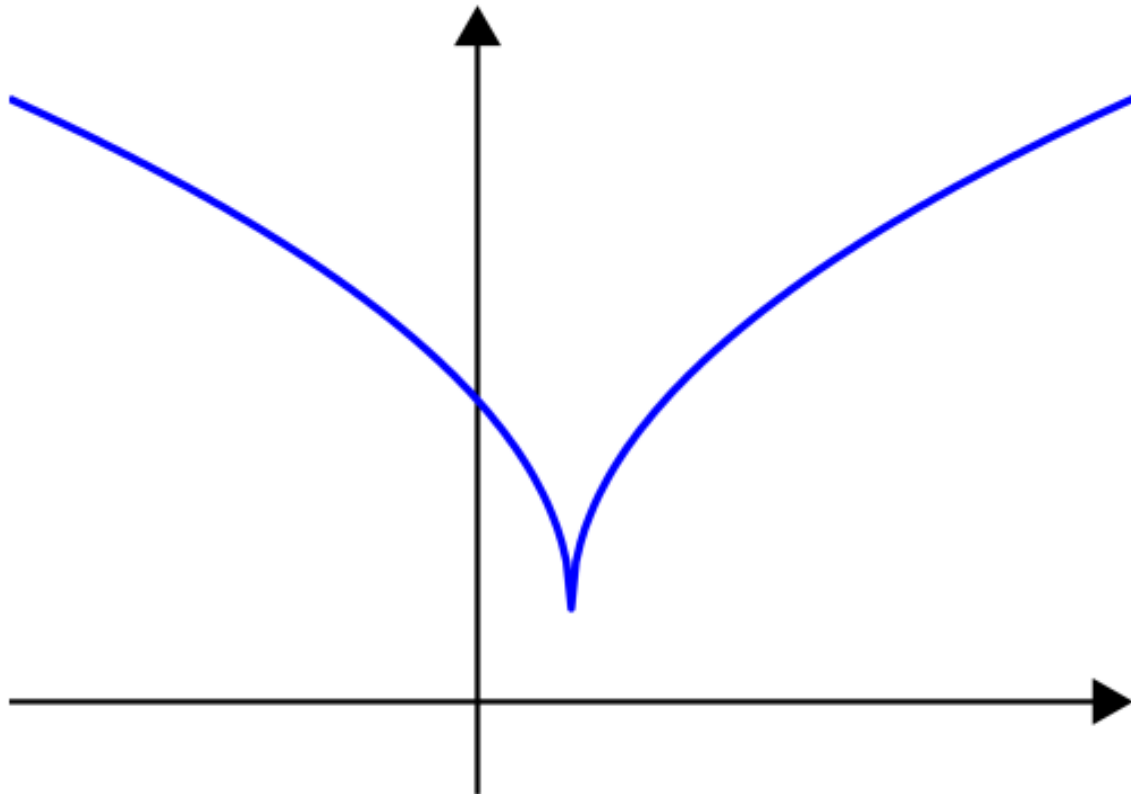


Further properties for strongly quasiconvex functions
and its consequences in the gradient method



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Abstract.- We provide first order characterizations for differentiable strongly quasiconvex functions (in the sense of Poljak-1966) via the behaviour of its gradient by extending the famous characterization of Arrow-Enthoven-1961 and, as a consequence, new algorithmic and monotonicity properties were developed. Furthermore, we apply these results for establishing exponential convergence for the first- and second-order gradient systems without assuming the usual Lipschitz continuity assumption on the gradient of the function. The explicit discretization of the first-order dynamical system leads to the gradient descent method while discretization of the second-order dynamical system with viscous damping recovers the heavy ball method. We establish the linear convergence of both methods as well as comparisons with other classes of nonconvex functions used in the gradient descent literature.

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