

## On damped second-order gradient systems

*lundi 12 novembre 2018 14:20 (50 minutes)*

Using small deformations of the total energy, as introduced in [31], we establish that damped second order gradient systems  $u''(t) + \gamma u'(t) + \nabla G(u(t)) = 0$ , Turn MathJax of may be viewed as quasi-gradient systems. In order to study the asymptotic behavior of these systems, we prove that any (nontrivial) desingularizing function appearing in KL inequality satisfies  $\varphi(s) \asymp \sqrt{s}$  whenever the original function is definable and CC. Variants to this result are given. These facts are used in turn to prove that a desingularizing function of the potential  $G$  also desingularizes the total energy and its deformed versions. Our approach brings forward several results interesting for their own sake: we provide an asymptotic alternative for quasi-gradient systems, either a trajectory converges, or its norm tends to infinity. The convergence rates are also analyzed by an original method based on a one-dimensional worst-case gradient system. We conclude by establishing the convergence of solutions of damped second order systems in various cases including the definable case. The real-analytic case is recovered and some results concerning convex functions are also derived.

**Orateur:** BÉGOUT, Pascal (TSE)