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Weakly admissible vector equilibrium problems

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Motivated by examples arising from random matrix theory, we introduce the class of weakly admissible vector equilibrium problems. They are minimization problems involving the logarithmic energies of many measures on the complex plane and external fields which satisfy a pretty weak growth assumption. Confronted to the problem that such functionals may be not well-defined, we map the complex plane onto the Riemann sphere and are led to study vector equilibrium problems on arbitrary compacts of \mathbb{R}^n , for which we establish existence and uniqueness of the minimizers.