

# FROM LIONS' INEQUALITY TO CONSTRUCTIVE CONVERGENCE RATES OF KINETIC EQUATIONS

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We start from an inequality by J.-L. Lions, dating back to the '60s, which compares a norm of a function to a weak norm of the gradient of the function itself. Such result is of broad interest, ranging from mathematical elasticity to PDEs, and numerics. More recently, Lions' inequality has been playing a crucial role in determining the convergence rates to equilibrium in dissipative kinetic equations. In this talk, we show new Lions' inequalities in weighted Sobolev spaces, with constants being explicit in the data of the problem, and in the dimension of the space. A novel weak Lions' inequality is also introduced, as a tool to overcome "weak confinement" in the kinetic setting.