

Optimization and Equilibrium Seminar

Speaker: Felipe Atenas (CMM)

Title: Variable stepsize splitting methods as relocated fixed-point iterations

Abstract: Splitting methods exploit model structures to decompose complex optimisation problems into simpler pieces, easier to handle. A prominent instance in this family is the Douglas-Rachford algorithm, which stands out due to its simplicity and numerical stability. Traditional convergence guarantees assume constant stepsizes, while the theory with variable stepsizes is scarce, limiting the improvement of numerical performance. Including the aforementioned method, several optimisation algorithms can be recast as fixed-point iterations using constant parameters, and thus share the same practical limitation. The fundamental challenge in varying the stepsize parameter stems from the stepsize-dependence of the fixed-point set of the iteration operator, thus preventing the use of classical arguments to guarantee convergence. To address this issue, we propose a novel paradigm of parametrised fixed-point iterations called relocated fixed-point iterations. As a byproduct, we obtain a variant of the Douglas-Rachford algorithm that allows updating the stepsize between iterations by composing the original Douglas-Rachford iteration with a fixed-point relocater operator. For finding a zero of the sum of two maximally monotone operators in a Hilbert space, we show that the resulting relocated Douglas-Rachford method converges weakly to a solution under mild assumptions on the asymptotic behaviour of the sequence of stepsizes. We also examine the improvement in the numerical performance when using the relocated fixed-point variant, and extensions to distributed settings and to methods of forward-backward type. *that these rates are optimal.*

Miércoles 29 de Abril 2026, a las 16:15 hrs.

Sala de Seminarios John Von Neumann del Centro de Modelamiento Matemático (Beauchef 851, Edificio Norte, Piso 7).

