MIN-MAX FORMULAS FOR NONLOCAL ELLIPTIC OPERATORS AND APPLICATIONS

NESTOR GUILLEN

A mapping F between spaces of real valued functions is said to have the "global comparison property" (GCP) if $u \leq v$ everywhere with $u = v$ at some point x means that $F(u) \leq F(v)$ at this point x. A classical result of Courrge says that a continuous linear map from $C^2(\mathbb{R}^d)$ to $C^0(\mathbb{R}^d)$ has the GCP if and only if it is a sum of jump and drift-diffusion operators. In work with Russell Schwab, we characterize nonlinear maps having the GCP as those given by a min-max of linear operators having the GCP. This result provides representation formulas for the Dirichlet-to-Neumann map of nonlinear elliptic equations, and for the interface velocity for various free boundary problems, respective applications will be discussed along with a list of related questions which are open.