We summarize in these lectures some of our results about the Minimizing Total Variation Flow, which have been mainly motivated by problems arising in Image Processing. First, we recall the role played by the Total Variation in Image Processing, in particular the variational formulation of the restoration problem. This model, initially introduced by Rudin, Osher and Fatemi, had a strong influence on the development of variational methods for image denoising and restoration, and pioneered the use of the BV model in Image Processing. After this analysis we outline some of the tools we need: functions of bounded variation, paring between measures and bounded functions and gradient flows in Hilbert spaces. Next, the Minimizing Total Variation Flow under different boundary conditions is studied and its main qualitative properties are exhibited. In particular, several explicit solutions are computed.

Contents

1.- Total Variation Flow in Image Processing
2.- Functions of Bounded Variation
3.- Paring between Measures and Bounde Functions
4.- Gradient Flows in Hilbert Spaces
5.- The Neumann Problem for the Total Variation Flow
6.- The Cauchy Problem for the Total Variation Flow.

*Departamento de Análisis Matemático, Universitat de Valencia, 46100 Burjassot (Valencia), Spain, mazon@uv.es