

# $L^p$ -Maximal Regularity of Second Order Evolution Equations on the Line

Felipe Poblete\*

Instituto de Ciencias Físicas y Matemáticas  
Universidad Austral de Chile  
Valdivia, Chile.

## Abstract

In this talk we introduce the concept of  $L^p$ -maximal regularity of the second order abstract differential equation on a Banach space  $X$

$$u''(t) + Au(t) + Bu'(t) = f(t), \quad t \in \mathbb{R}, \quad (1)$$

where  $A: D(A) \subseteq X \rightarrow X$  and  $B: D(B) \subseteq X \rightarrow X$  are closed linear operators and  $f$  is a  $X$ -valued function. We characterize the  $L^p$ -maximal regularity in terms of  $L^p$ -multipliers and we exhibit examples, in UMD spaces, where in some cases the equation (1) is  $L^p$ -maximal regular and in other cases it is not. Also we introduce a mild concept of the  $L^p$ -maximal regularity which will be denoted by  $W^{r,p}$ -maximal regularity ( $0 \leq r \leq 2$ ) and we show sufficient conditions to obtain it. We exhibit explicit examples where the equation (1) is  $W^{r,p}$ -maximal regular while this equation is not  $L^p$ -maximal regular.

---

\*Partially supported by FONDECYT 1170466 and DID S-2017-43, e-mail: felipe.poblete@uach.cl