



# SEMINÁRIO DE EQUAÇÕES DIFERENCIAIS

**On an inequality by Brezis-Merle and the 1-biharmonic operator**

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**Resumo:** We study optimal embeddings for the space of functions whose Laplacian belongs to  $L^1(\Omega)$ , where  $\Omega \subset \mathbb{R}^N$  is a bounded domain. This function space turns out to be strictly larger than the Sobolev space  $W^{2,1}(\Omega)$  in which the whole set of second order derivatives is considered. In particular, in the limiting Sobolev case, when  $N = 2$ , we establish a sharp embedding inequality into the Zygmund space  $L_{exp}(\Omega)$ . This result enables us to improve the Brezis-Merle regularity estimate for the Dirichlet problem  $\Delta u = f(x) \in L^1(\Omega)$ ,  $u = 0$  on  $\partial\Omega$ . We then study the operator associated to this problem, the 1-biharmonic operator.