

## Best space of a fixed dimension

A. Bressan and E. Sande

Consider the space  $\mathbb{S}_{p,k,n}$  of piecewise polynomials  $[0, 1] \rightarrow \mathbb{R}$  of degree  $p$  on the uniform partitions in  $n$  segments and having  $k$  continuous derivatives. Let  $C_{p,k,n}$  be the best constant such that:  $\forall f \in H^{p+1}(0, 1)$

$$\|f - \Pi^\perp f\|_{L^2} \leq C_{p,k,n} \|\partial^{p+1} f\|_{L^2}.$$

Which pair of parameters  $(k, n)$  minimizes  $C_{p,k,n}$  for a fixed degree and space dimension? We can not answer the question completely. However, we can compare the interesting cases  $k = -1$  used in DG,  $k = 0$  used in FEM and  $k = p - 1$  used in IGA. The answer extends to broken Sobolev spaces and to tensor product spaces.