AMG (Brandt, McCormick and Ruge, 1984)

Algebraic MultiGrid methods do not explicitly use the problem geometry but rely only on matrix entries to generate coarse-grids by using characterizations of *algebraic smoothness*

Key issue in effective AMG for general matrices

error not reduced by the (chosen) smoother are called algebraic smoothness:

$$(Aw)_i = r_i \approx 0 \Longrightarrow w_{i+1} \approx w_i$$

effective AMG requires that algebraic smoothness is well represented on the coarse grid and well interpolated back $\mathbf{w} = (w_i) \in \mathcal{R}ange(P)$