

# Recent results on $(p, q)$ -Laplacian type equations

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## Abstract.

Starting from a new sum decomposition of  $W^{1,p}(\mathbb{R}^N) \cap W^{1,q}(\mathbb{R}^N)$  and using a variational approach, we investigate the existence of multiple weak solutions of a  $(p, q)$ -Laplacian equation on  $\mathbb{R}^N$ , for  $1 < q < p < N$ , with a sign-changing potential and a Carathéodory reaction term satisfying the celebrated Ambrosetti–Rabinowitz condition. Our assumptions are mild and different from those used in related papers and moreover our results improve or complement previous ones for the single  $p$ -Laplacian.