Critical Elliptic Systems crossing high eigenvalues

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Abstract. In this paper we study the existence of multiple solutions for the non-homogeneous system

$$\begin{cases} -\Delta u = au + bv + \dfrac{2\alpha}{\alpha+\beta} {u_+}^{\alpha-1} {v_+}^{\beta} + f, & \Omega \\ -\Delta v = cu + dv + \dfrac{2\beta}{\alpha+\beta} {u_+}^{\alpha} {v_+}^{\beta-1} + g, & \Omega \\ u = v = 0, & \partial\Omega, \end{cases} \tag{1}$$

where $\Omega \subset \mathbb{R}^N$ is a bounded smooth domain; $\alpha, \beta > 1$ are real constants, $\alpha + \beta = 2^*$, where $2^* = \frac{2N}{N-2}, N \geq 3$; $w_+ = max\{w, 0\}$ and $f, g \in L^s(\Omega)$ for some $s > N$. Our main hypothesis is that the eigenvalues of the symmetric matrix $A = \begin{pmatrix} a & b \\ b & d \end{pmatrix}$ lies between two consecutive eigenvalues of the Laplacian operator.

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