

**MULTIPLE MIXED INTERIOR AND BOUNDARY PEAKS  
SYNCHRONIZED SOLUTIONS  
FOR LINEARLY COUPLED SCHRÖDINGER SYSTEMS**

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ABSTRACT. In the present paper we consider the problem:

$$(N_\varepsilon) \quad \begin{cases} -\varepsilon^2 \Delta u + u = u^3 + \lambda v & \text{in } \Omega, \\ -\varepsilon^2 \Delta v + v = v^3 + \lambda u & \text{in } \Omega, \\ u > 0, v > 0 & \text{in } \Omega, \\ \frac{\partial u}{\partial n} = \frac{\partial v}{\partial n} = 0 & \text{on } \partial\Omega, \end{cases}$$

where  $\varepsilon > 0$ ,  $0 < \lambda < 1$ ,  $\Omega \subset \mathbb{R}^3$  is smooth and bounded, and  $n$  denotes the outer normal vector defined on  $\partial\Omega$ , the boundary of  $\Omega$ . By the Lyapunov–Schmidt reduction method and the maximum principle of elliptic equations, we construct synchronized solutions of  $(N_\varepsilon)$  with mixed interior and boundary peaks for any  $0 < \varepsilon < \varepsilon_0$  and  $\lambda \in (0, 1) \setminus \{\lambda_0\}$ , where  $\lambda_0 \in (0, 1)$  is given and  $\varepsilon_0 > 0$  is sufficiently small. As  $\varepsilon$  approaches 0, the interior peaks concentrate at sphere packing points in  $\Omega$  and the boundary peaks concentrate at the critical points of the mean curvature function of the boundary.

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*Key words and phrases.* Schrödinger system; linearly coupled terms; mixed multiple spikes.