

## A decomposition structure of resonance graphs that are daisy cubes

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The resonance graph of a plane bipartite graph  $G$ , denoted by  $R(G)$ , is a graph whose vertex set is the set of perfect matchings of  $G$  and two perfect matchings are adjacent if their symmetric difference forms the periphery of exactly one finite face of  $G$ . Lam and Zhang [*Order* **20** (2003) 13–29] showed that any connected resonance graph can be oriented as the Hasse diagram of a finite distributive lattice. The concept of daisy cubes was introduced by Klavžar and Mollard [*European J. Combin.* **80** (2019) 214–223]. A daisy cube is an induced subgraph of a hypercube that is generated by a downward closed subset of poset  $(\mathcal{B}^n, \leq)$ . It has recently been shown in [*Discrete Appl. Math.* **366** (2025) 75–85] that the resonance graph of a plane elementary bipartite graph  $G$  with more than two vertices is a daisy cube if and only if  $G$  is peripherally 2-colorable. Let  $G$  be a peripherally 2-colorable graph. In this talk, we present a decomposition structure of  $R(G)$  with respect to an arbitrary finite face of  $G$ , together with a proper labelling for the vertex set of  $R(G)$ . As an application, we obtain an algorithm to generate a binary coding for the vertex set of  $R(G)$  as a daisy cube. Moreover, the binary coding can be easily transformed into one so that  $R(G)$  can be oriented as the Hasse diagram of a finite distributive lattice.

Keywords: daisy cube, finite distributive lattice, peripherally 2-colorable graph, resonance graph