

Meeting: 999, Nashville, Tennessee, SS 14A, Special Session on Graph Theory and Matroid Theory

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Serguei Norine* (snorine@math.gatech.edu) and **Robin Thomas**
(thomas@math.gatech.edu). *Pfaffian labellings and signs of edge colorings.*

The list edge coloring conjecture states that every k -edge colorable multigraph is k -edge choosable. Ellingham and Goddyn verified this conjecture for d -edge colorable d -regular planar multigraphs by proving that all d -edge colorings of such multigraphs have the same sign. Goddyn conjectured that if a d -edge colorable d -regular multigraph G admits a Pfaffian orientation then all of its d -edge colorings have the same sign.

We prove Goddyn's conjecture for a slightly larger class of multigraphs that admit a "Pfaffian labelling". Conversely, we prove that if a multigraph does not admit a Pfaffian labelling, then by adding parallel edges we can obtain from it a d -regular multigraph with two d -edge colorings of different signs. Furthermore, we prove that all the graphs that have Pfaffian labellings can be constructed in a certain way from Pfaffian graphs and the Petersen graph. We also describe graphs with Pfaffian labellings in terms of their drawings in the projective plane. (Received August 23, 2004)