Discrete Mathematics Seminar

Time: Friday, 12 October 2012, 1:30–2:30 PM
Location: 238 Derrick Hall
Title: Group Connectivity in Line Graphs
Speaker: Dr. Senmei Yao, Department of Mathematics, Marian University

Abstract:

Tutte introduced the theory of nowhere zero flows and showed that a plane graph G has a face k-coloring if and only if G has a nowhere zero A-flow, for any Abelian group A with $|A| \geq k$. In 1992 Jaeger et al extended nowhere zero flows to group connectivity of graphs: given an orientation D of a graph G, if for any $b : V(G) \mapsto A$ with $\sum_{v \in V(G)} b(v) = 0$, there always exists a map $f : E(G) \mapsto A - \{0\}$, such that at each $v \in V(G)$,

$$\sum_{e = vw \text{ is directed from } v \text{ to } w} f(e) - \sum_{e = uv \text{ is directed from } u \text{ to } v} f(e) = b(v)$$

in A, then G is A-connected. Let $\mathbb{Z}_3$ denote the cyclic group of order 3. Jaeger et al conjectured that every 5-edge-connected graph is $\mathbb{Z}_3$-connected. We proved the following:
(i) Every 5-edge-connected graph is $\mathbb{Z}_3$-connected if and only if every 5-edge-connected line graph is $\mathbb{Z}_3$-connected.
(ii) Every 6-edge-connected triangular line graph is $\mathbb{Z}_3$-connected.
(iii) Every 7-edge-connected triangular claw-free graph is $\mathbb{Z}_3$-connected.
In particular, every 6-edge-connected triangular line graph and every 7-edge-connected triangular claw-free graph have a nowhere zero 3-flow.

Key words: nowhere zero flows, group connectivity, line graphs, claw-free graphs, triangular graphs

Bio:

Dr. Senmei Yao is currently an Assistant Professor of Mathematics at Marian University in Fond du Lac, Wisconsin. This semester she is teaching Pre-Calculus, Combinatorics, and Introduction to Mathematical Statistics.

She received her B.S. in Mathematics in 2006 from University of Science and Technology of China, received her M.S. in Mathematics in 2009 and her Ph.D. in Mathematics in 2012 from West Virginia University.

Her main research interest is on nowhere zero flows and group connectivity in graph theory, and so far she has four paper published. Also she is very interested in statistics, like programming and data analysis.