Contribution ID: **16** Type: **not specified**

Integer flows in Cayley graphs

This is a survey talk about Tutte's integer flows in Cayley graphs. Alspach conjectured that every connected Cayley graph contains a Hamilton cycle. After almost five decades, Alspach's conjecture remains widely open. Note that every Hamiltonian graph admits a nowhere-zero 4-flow. The following is a weaker version of Alspach's conjecture (by Alspach, Liu and Z) that every Cayley graph admits a nowhere-zero 4-flow (equivalently, there is no Cayley snarks). Integer flow theory was introduced by Tutte as a dual version of graph coloring. Tutte proposed several conjectures about integer flows, such as, 3-, 4- and 5-flow conjecture. The progress of Tutte's conjectures for Cayley graphs will be surveyed and possible strengthening of those early results will be discussed based on
some recent progress in flow theory.

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