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Loops from a graph point of view.

Over the last years several authors studied the correspondence between geometric structures, loops and regular permutation sets. These relationships were first introduced by H. Karzel and H. Wefelscheid in order to associate to the point-set of a general hyperbolic geometry over a Euclidean field the algebraic structure of a *Bruck loop* (or *K-loop*) and use it for a “coordinatization” of the geometry.

This research is placed in the line of investigations aiming at employing geometric structures and the related insight in order to build up loops and to study their algebraic properties. We present a generalization, introduced in [1], of the idea of describing loops by means of graphs: we show how to relate a loop to suitable *edge-colouring of complete directed graphs*, we find conditions characterizing graphs giving rise to the same loop, to isomorphic and to isotopic loops and we describe loop automorphisms in terms of graph automorphisms permuting the colouring.

References

- [1] Stefano Pasotti and Elena Zizioli, *Loops, regular permutation sets and colourings of directed graphs*, J. Geom. **106** (2015), 35–45.

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