Applying the Kirchhoff relations in proofs of theorems on graph operations that are not affecting the structure of sandpile group

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Abstract. The sandpile group of the graph is defined. A series of interesting properties of this group is presented. Theorems on graph operations that do not affect the structure of the sandpile groups is suggested. The Kirchhoff group of graph is defined. The construction of this group is based on relations similar to Kirchhoff laws for electric circuits. The Kirchhoff group of graph is isomorphic to the sandpile group of this graph. New proofs of theorems about graph operations are constructed with usage of this fact.

References

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