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Some recent results on duality and planarity

In: Zdeněk Frolík (ed.): Abstracta. 9th Winter School on Abstract Analysis. Czechoslovak Academy of Sciences, Praha, 1981. pp. 151--152.

Persistent URL: <http://dml.cz/dmlcz/701245>

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NINTH WINTER SCHOOL ON ABSTRACT ANALYSIS (1981)

SOME RECENT RESULTS ON DUALITY AND PLANARITY

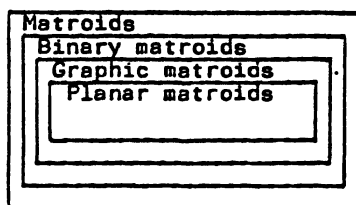
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One of the most beautiful properties of planarity is (at least from the engineers' point of view) that it is equivalent to the existence of the dual in graph theory (Whitney, 1933).

Within the much larger class of matroids every object has a dual but it will never be graphic unless the original matroid was the cycle matroid of a planar graph.

Hence engineers were still not satisfied and tried to visualize nongraphic matroids (at least the duals of non-planar graphs) in various unusual ways. Some of these attempts have led to interesting (pure mathematical) results, mostly for binary matroids.

The present talk gives a general introduction to matroids at first, then gives two such "representations" in some details (Holzmann, 1979; Ünver and Ceyhun, 1978). Finally it sketches some recent contributions to the two types of duality in electric network theory (Iri and Recski, 1980).



The full paper was prepared to the Graph Theory Conference, dedicated to the memory of Professor K. Kuratowski (Łagów, Poland, 10-13 February 1981). Copies are available from the author.