Geelen, J.; **Gerards, B.**; **Robertson, N.**; **Whittle, G.**

Obstructions to branch-decomposition of matroids. (English) Zbl 1094.05011

J. Comb. Theory, Ser. B 96, No. 4, 560-570 (2006).

From the abstract: "A (δ,γ)-net in a matroid M is a pair $(N,\mathcal{P})$ where N is a minor of M, $\mathcal{P}$ is a set of series classes in N, $|\mathcal{P}|\geq\delta$, and the pairwise connectivity, in M, between any two members of $\mathcal{P}$ is at least γ. We prove that, for any finite field $\mathbb{F}$, nets provide a qualitative characterization for branch-width in the class of $\mathbb{F}$-representable matroids. That is, for an $\mathbb{F}$-representable matroid M, we prove that (1) if M contains a (δ,γ)-net where δ and γ are both very large, then M has large branch-width, and conversely, (2) if the branch-width of M is very large, then M or M^* contains a (δ,γ)-net where δ and γ are both large."

For graphs, such a qualitative characterization was obtained by *N. Robertson* and *P. D. Seymour* [J. Comb. Theory, Ser. B 41, 92–114 (1986; Zbl 0598.05055)].

Reviewer: Kelly J. Pearson (Murray)

MSC:

05B35 Combinatorial aspects of matroids and geometric lattices

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References:

[1] Bixby, R.E.; Cunningham, W.H., Matroid optimization and algorithms, () · Zbl 0848.05017

[2] Dharmatilake, J.S., A MIN-MAX theorem using matroid separations, (), 333-342 · Zbl 0954.05014

[3] Geelen, J.F.; Gerards, A.M.H.; Robertson, N.; Whittle, G.P., On the excluded-minors for the matroids of branch-width \textit{k}, J. combin. theory ser. B, 88, 261-265, (2003) · Zbl 1032.05027

[4] T. Johnson, N. Robertson, P.D. Seymour, Connectivity in binary matroids, handwritten manuscript

[5] Kung, J.P.S., Extremal matroid theory, (), 21-62 · Zbl 0791.05018

[6] Oporowski, B., Partitioning matroids with only small cocircuits, Combin. probab. comput., 11, 191-197, (2002) · Zbl 0996.05025

[7] Oxley, J.G., Matroid theory, (1992), Oxford Univ. Press New York · Zbl 0784.05002

[8] Robertson, N.; Seymour, P.D., Graph minors V: excluding a planar graph, J. combin. theory ser. B, 41, 92-114, (1986) · Zbl 0598.05055

[9] Robertson, N.; Seymour, P.D., Graph minors X: obstructions to tree-decomposition, J. combin. theory ser. B, 52, 153-190, (1991) · Zbl 0764.05069

[10] Tutte, W.T., Menger's theorem for matroids, J. res. nat. bur. standards, B. math. math. phys. B, 69, 49-53, (1965) · Zbl 0151.33802