# Connectivity of $\Delta$–Matroids

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A $\Delta$–matroid is a set system $D = (V, \mathcal{F})$ where $V$ is a finite set and $\mathcal{F} \subseteq \mathcal{P}(\mathcal{V})$ satisfies the following $\Delta$–*Exchange Axiom:*

$(A\Delta)$ for $F_1, F_2 \in \{$, for $x \in F_1 \Delta F_2$, there exist $y \in F_1 \Delta F_2$ such that $F_1 \Delta x, y \in \mathcal{F}$.

Given a partition $V', V"$ of a set $V$, two subsets $\mathcal{F}' \subseteq \mathcal{P}(\mathcal{V}'), \mathcal{F}" \subseteq \mathcal{P}(\mathcal{V}")$, we define:

$$F' \times F" = F' \cup F" : F' \in F', F" \in F".$$

Let $D = (V, \mathcal{F})$ be $\Delta$–matroid. A subset $V' \subseteq V$ is a $1-$ *separator* of $D$ if there exists $\mathcal{F}' \subseteq \mathcal{P}(\mathcal{V}')$ and $\mathcal{F}" \subseteq \mathcal{P}(\mathcal{V}")$ such that $\mathcal{F} = \mathcal{F}' \times \mathcal{F}"$.

The subset $V'$ is a 2–*separator* of $D$ if there exists $\mathcal{F}'_\infty, \mathcal{F}'_\in \subseteq \mathcal{P}(\mathcal{V}')$ and $\mathcal{F}"_\infty, \mathcal{F}"_\in \subseteq \mathcal{P}(\mathcal{V}")$ such that $\mathcal{F} = (\mathcal{F}'_\infty \times \mathcal{F}"_\infty \cup (\mathcal{F}'_\in \times \mathcal{F}"_\in)$.

We define a graph $G^2_D$ associated with a $\Delta$–matroid $D$ and we characterize the behaviour of graph $G^2_D$ when $D$ has a 1 – separator and when $D$ is even and it has a 2 – separator.

On the other hand, we study representability of $D$–matroids under composition. Suppose we want to compose two $\Delta$–matroids $D_1$ and $D_2$ and let $D$ be the $\Delta$–matroid resulting by the composition, then if $D_1, D_2$ are representables over a field $\mathbb{F}$, we obtain the representation of $D$ for the case when $D$ is an even $\Delta$–matroid.