5007-05-241 **Carlos A. Alfaro*** (alfaromontufar@gmail.com), Apartado Postal 14–740, 07000 Mexico City, Mexico, and **H. Hugo Corrales** (hhcorrales@gmail.com) and **Carlos E. Valencia** (cvalencia@math.cinvestav.mx). *γ-critical graphs.*

Given a *graph* $G = (V, E)$ with n vertices, the *generalized Laplacian matrix* of G is

$$L(G, X_G)_{u,v} = \begin{cases} x_u & \text{if } u = v, \\ -m_{(u,v)} & \text{otherwise,} \end{cases}$$

where $m_{(u,v)}$ is the number of edges between vertices u and v. If d_G is the degree vector of G, then $L(G, X = d_G)$ is the Laplacian matrix $L(G)$ of G. The *critical ideals* of G are given by

$$I_i(G, X_G) = \langle \text{minors}_i(L(G, X_G)) \rangle \subseteq \mathcal{R}[X_G] \text{ for all } 1 \leq i \leq n,$$

where $\mathcal{R}$ is a commutative ring. Let $\gamma_{\mathcal{R}}(G) = \max\{i \mid I_i(G, X) = \langle 1 \rangle\}$. We say that a graph is γ-*critical* when $\gamma_{\mathcal{R}}(G \setminus v) < \gamma_{\mathcal{R}}(G)$ for all $v \in V$. Moreover, when $\mathcal{R} = \mathbb{Z}$, critical ideals generalize the critical group of a graph; the torsion part of the *cokernel* of $L(G)$. The study and characterization of graphs with critical group having i invariant factors equal to one have been of great interest. We classify all the γ-critical graphs with $\gamma \leq 2$. As consequence we get a classification of the simple graphs whose critical group has one and two invariant factors equal to one. (Received May 08, 2013)