A standard basis $\{\vec{e}_1, \vec{e}_2, \ldots, \vec{e}_n\}$, the elements of $\vec{e}_i$ are all zero except for i^{th} element, which is one.

$$\vec{m} = \begin{bmatrix} \alpha_1 \\ \vdots \\ \alpha_n \end{bmatrix} = \alpha_1 \vec{e}_1 + \alpha_2 \vec{e}_2 + \cdots + \alpha_n \vec{e}_n = \sum_{i=1}^{n} \alpha_i \vec{e}_i$$

$$G(\vec{m}) = G\left(\sum_{i=1}^{n} \alpha_i \vec{e}_i\right) = \sum_{i=1}^{n} \alpha_i G(\vec{e}_i)$$

$$= \left[G(\vec{e}_1) \cdots G(\vec{e}_n) \right] \begin{bmatrix} \alpha_1 \\ \vdots \\ \alpha_n \end{bmatrix}$$

$$= \left[G(\vec{e}_1) \cdots G(\vec{e}_n) \right] \vec{m}$$

$$= \overline{\overline{\Gamma}}\, \vec{m}$$

So, $\overline{\overline{\Gamma}} = \left[G(\vec{e}_1) \cdots G(\vec{e}_n) \right]$,

and its size is $m \times n$