changes, and so does the set $\mathcal{N}(\mathcal{S}') - \mathcal{S}'_{\mathcal{I}}$. In addition, the span of a subset of $\{h'_1, \cdots, h'_r\}$ can change after the operation of V, though the span of the full set remains unchanged. This means that if we add less than the maximum amount of entanglement to a code, we must optimize over such unitary row operations. Since the group $\mathcal{S}'_{\mathcal{I}}$ and the set $\mathcal{N}(\mathcal{S}') - \mathcal{S}'_{\mathcal{I}}$ remain the same under the operation of type 1 unitary row operators that operate on the h'_j for $j \notin T$, it suffices to assume that the operation V consists of type 1 unitary row operators that operate only on the h'_j for $j \in T$.

Let M_V be a $c \times r$ matrix such that the $i-$th row of M_V is the t_i-th row of M_Z for $i = 1, \cdots, c$. It is obvious that some M_V's have the same effect on the row space of H'. For example, if $c = 2$, $\{g'_1 g'_2, g'_2, \cdots, g'_r, h'_1, h'_1 h'_2\}$ and $\{g'_1, g'_2, \cdots, g'_r, h'_1, h'_2\}$ are two different sets of generators but they generate the same space and hence their corresponding EAQEC codes have the same minimum distance. Therefore, a distinct unitary row operation V is assumed to be be represented by a matrix M_V in reduced row echelon form.

Theorem 3. The operation of V is equivalent to applying a series of type 1 unitary row operators on the h'_j for $j \in T$. In addition, there are

$$N(r,c) \triangleq \sum_{l_c=0}^{r-c} \sum_{l_{c-1}=0}^{l_c} \sum_{l_{c-2}}^{l_{c-1}} \cdots \sum_{l_1=0}^{l_2} 2^{c(r-c) - \sum_{i=1}^{c} l_i}$$

distinct unitary row operations.

Proof. The total number of distinct unitary row operations $N(r,c)$ is determined as follows. If we begin with matrices of the form

$$\begin{bmatrix} 1 & 0 & \cdots & 0 & \square & \cdots & \square \\ 0 & 1 & \cdots & 0 & \square & \cdots & \square \\ \vdots & \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & 1 & \square & \cdots & \square \end{bmatrix},$$