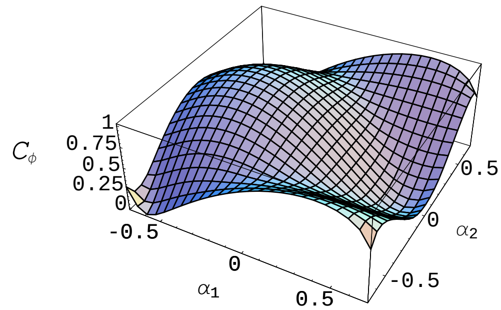

FIG. 1: (color online). The entanglement degree of the initial state $|\phi\rangle$ for different α_1 and α_2.

defined as follows

$$I^a = \sum_i F_i^a,$$
$$J^a = \mu I_1^a + \nu I_2^a + \frac{i}{2}\lambda f_{abc} \sum_{i \neq j} \omega_{ij} I_i^b I_j^c \ \ (i,j=1,2). \tag{4}$$

Here I^a form a $su(3)$ algebra characterized by f_{abc}, $\{F_i^a, a=1,\cdots,8\}$ form a local $su(3)$ on the i site, and are equal to half of the corresponding Gell-Mann matrices, μ, ν, λ are parameters or Casimir operators and $\omega_{ij} = -\omega_{ji}$ which satisfies

$$\omega_{ij} = \begin{cases} 1 & i>j \\ -1 & i<j \\ 0 & i=j \end{cases}. \tag{5}$$

A more practical expression is expressed as

$$\bar{I}^{\pm} = J^1 \pm i J^2, \quad \bar{U}^{\pm} = J^6 \pm i J^7, \quad \bar{V}^{\pm} = J^4 \pm i J^5, \quad \bar{I}^3 = J^3, \quad \bar{I}^8 = \frac{2}{\sqrt{3}} J^8. \tag{6}$$

Here J^a $(a=1,\cdots,8)$ are the generators of $Y(su(3))$.

Due to the transition effect of Yangian generators, transition operators P can be constructed as compositions of the generators in Eq. (6). P can be looked upon as a function of $\bar{I}^{\pm}, \bar{U}^{\pm}, \bar{V}^{\pm}, \bar{I}^3$ and $\bar{I}^8$, namely, $P = F[\bar{I}^{\pm}, \bar{U}^{\pm}, \bar{V}^{\pm}, \bar{I}^3, \bar{I}^8]$. When acting the transition operator on $|\phi\rangle$ in Eq. (1), a final state $|\phi'\rangle = P|\phi\rangle$ can be gotten and its entanglement degree $C_{\phi'}$ can also be calculated out via Eq.(2). Different final states with desired entanglement degrees thus can be gotten by acting corresponding transition operators on initial states.

In order to illustrate this issue clearly, several simple examples are going to be discussed in more detail.