Summary: The superposition of Caputo fractional derivative holds for $\alpha + \beta \leq 1(\alpha > 0, \beta > 0)$ and in interval $[0, T]$. Whether the superposition of Caputo fractional derivative can be established in general $n - 1 < \alpha + \beta \leq n(n \in \mathbb{N}^+)$ and any interval $[a, b]$ is studied. The method of combining beta function with the definition of Caputo fractional derivative is given. It is proved that the superposition can still be established in $n - 1 < \alpha + \beta \leq n$ and any interval $[a, b]$. Finally, an example is given to show the correctness of the conclusion.

MSC:

26A33 Fractional derivatives and integrals

Keywords:

Caputo fractional derivative; Beta function; Gamma function; Laplace transformation