# ANALYSIS ON FUNCTIONAL DIFFERENTIAL NONLOCAL CAUCHY PROBLEM WITH STATE-DEPENDENT DELAY 

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#### Abstract

We study existence, uniqueness and continuous dependence of a mild solution for neutral functional differential nonlocal Cauchy problem with state-dependent delay in general Banach spaces are studied by using the fixed point technique and semigroup of operators.


Keywords. State dependent delay, Neutral differential equation, Mild solution, Analytic semigroup.

AMS (MOS) subject classification: 34K40, 34K30, 47D06.

## 1 Introduction

In this paper, we study the existence, uniqueness and continuous dependence of mild solution of a nonlocal abstract Cauchy problem for neutral functional differential equation with state-dependent delay. Such problems arise in some physical applications as a natural generalization of the classical initial value problems. The results for semilinear neutral functional differential nonlocal problem [8, 9] with state-dependent delay. We now study the existence, uniqueness and continuous dependence of a mild solution for an neutral functional differential evolution nonlocal Cauchy problem with statedependent delay of the form

$$
\begin{align*}
\frac{d}{d t}\left[u(t)+\mathcal{G}\left(t, u_{\sigma_{1}\left(t, u_{t}\right)}\right)\right] & =\mathcal{A} u(t)+\mathcal{F}\left(t, u_{\sigma_{2}\left(t, u_{t}\right)}\right), \quad t \in(0, a] \\
u(t)+\left(h\left(u_{t_{1}}, u_{t_{2}}, \ldots, u_{t_{p}}\right)\right)(t) & =\phi(t), \quad t \in[-r, 0] \tag{1.1}
\end{align*}
$$

where $0<t_{1}<t_{2}<\cdots<t_{p} \leq a, p \in N, A . f, g, h$ and $\phi$ given functions satisfying some assumptions, $u_{t}(s)=u(t+s)$ for $t \in[0, a], s \in[-r, 0]$.

Functional differential equations with state-dependent delay appear frequently in applications as model of equations and for this reason the study of this type of equations has received great attention in the last years $[1,3,6$,

