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## 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

$$\frac{d}{dt} \Big[ u(t) + \mathcal{G}(t, u_{\sigma_1(t, u_t)}) \Big] = \mathcal{A}u(t) + \mathcal{F}(t, u_{\sigma_2(t, u_t)}), \quad t \in (0, a]$$
$$u(t) + (h(u_{t_1}, u_{t_2}, \dots, u_{t_n}))(t) = \phi(t), \quad t \in [-r, 0], \tag{1.1}$$

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,