

EXISTENCE OF SOLUTION AND NUMERICAL METHODS FOR
FORWARD-BACKWARD EQUATIONS

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This talk is concerned with the analysis of forward-backward equations of the general form:

$$x'(t) = a(t)x(t) + b(t)x(t-1) + c(t)x(t+1).$$

We search for a solution $x(t)$, defined on a certain interval $[-1, N+1]$, ($N > 0$), which satisfies the following conditions:

$$x(t) = \begin{cases} \Phi_1(t), & t \in [-1, 0]; \\ \Phi_2(t), & t \in (N, N+1], \end{cases}$$

where Φ_1 and Φ_2 are given functions. We investigate the conditions that Φ_1 and Φ_2 must satisfy in order to guarantee existence of solution to the considered problem. With this purpose we reduce it to an initial value problem for a delay differential equation (DDE). Using this approach, the numerical solution is obtained by adapting standard computational methods for DDE.