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On the investigation of integral boundary value problems

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We consider the non-linear integral boundary value problem (BVP)

$$\frac{dx(t)}{dt} = f\left(t, x(t)\right), \quad t \in [a, b], \int_a^b g(s, x(s))ds = d,$$

Let D_a and D_b be a bounded subsets of $\mathbb{R}^n$ where one looks for respectively the initial value $x(a)$ and the value $x(b)$ of the solution. The problem is to find a continuously differentiable solution $x : [a, b] \to D$ with initial value $x(a) \in D_a$.

At first, instead of the given integral BVP we will study the following „model type"two-point BVP with separated parametrized conditions

$$\frac{dx(t)}{dt} = f\left(t, x(t)\right), \; x(a) = z, \; x(b) = \eta,$$

where $z := \mathrm{col}(z_1, z_2, ..., z_n) = x(a)$, $\eta := \mathrm{col}(\eta_1, \eta_2, ..., \eta_n) = x(b)$ are considered as parameters, thereafter we go back to the original problem.

1. **A. Rontó, M. Rontó and Y. Varha** A new approach to non-local boundary value problems for ordinary differential systems, Applied Mathematics and Computation, 250 (2015), No. 1, 689-700, doi:10.1016/j.amc.2014.11.021.