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An Existence Theorem and an Approximate Solution Method for a Pfaff Equation with Continuous Coefficients

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Abstract—Pfaff equations with continuous coefficients are considered. A specific Cauchy problem for a Pfaff equation is transformed to an equivalent system of integral equations of a special type, which is overdetermined. It is shown that in the case of smooth coefficients the consistency of the system is equivalent to the Frobenius integrability criterion. A theorem on the existence of a solution for the obtained type of integral equations is presented. The solution is found by the Euler polygonal method, which allows one to construct an approximate solution of the Pfaff equation. An analog of Nagumo's theorem on the uniqueness of the solution to the Cauchy problem is also given.

Keywords: Pfaff equation, integral equation, consistency of a system, Frobenius criterion, existence theorem, Euler polygonal lines, uniqueness of solution, Nagumo condition.

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