

Abstract

Let $\mathbf{X} : \Omega \rightarrow \mathbb{R}^3 \in C^1(\Omega)$ be a vector valued mapping defined on the domain $\Omega \subset \mathbb{R}^2$. In this thesis we study the system of differential equations

$$(d\mathbf{X})^2 = ds^2$$

where the right handed side

$$ds^2 = g_{ij} dx^i dx^j = E dx^2 + 2F dx dy + G dy^2, \quad (x^1, x^2) = (x, y)$$

consists of prescribed functions $g_{ij} = g_{ij}(x^1, x^2) : \Omega \rightarrow \mathbb{R} \in C^4(\Omega)$ with different further properties. Certain boundary or initial conditions are considered

$$\mathbf{X}|_{\Gamma} = \mathbf{Y}$$

where Γ is the boundary or an interior curve of Ω . We describe a method to transform this problem into an equivalent boundary or initial value problem of a system of partial differential equations which can be treated by known theory. In the case of boundary values some a-priori estimates are established. In the case of initial values we prove an existence theorem based on the contraction mapping principle. We also give some quantitative results.