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Special curved elements and theitr application [Abstract of thesis]

Commentationes Mathematicae Universitatis Carolinae, Vol. 31 (1990), No. 1, 193

Persistent URL: http://dml.cz/dmlcz/106840

for the velocity are supposed. The unicity of the weak solution for the velocity is proved for a limited set of values of physical parameters.

Nonconforming finite elements are used for the discrete approximation of the space $\vec{W}^{1,3}(\Omega)$. The sufficient condition of discrete coercivity is derived. The existence of a discrete velocity is proved under conditions which are analogous to unicity conditions of the weak solution. The unicity of discrete pressure except for an addition of a constant is proved.

The usual numerical methods are used for the practical computation of some simple cases.

SPECIAL CURVED ELEMENTS AND THEIR APPLICATION

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(19.6.1989)

Special curved elements are constructed in the submitted thesis. Further they are used to the definition of the interpolation functions and the application to the solution of contact problems by means of the finite elements method is shown.

In Chapter I the mapping F which maps a rectangle onto a triangle is defined and its main properties are proved. In Chapter II conditions laid upon the triangulation of the domain Ω are formulated and some preliminary estimates are proved. The definitions of interpolation functions of two types are contained in Chapter III. The estimates of $\|f - \varphi\|$, φ is the interpolation function associated to f, are proved in the following chapter. These estimates are used to prove convergence of the finite elements method in the case of second order homogenous boundary value problems with $\mathring{W}_2^{(1)}$ – elliptic bilinear form.

In Chapter V the finite elements method is applied to the solution of the equivalent barotropic vorticity equation. In the last chapter the same method is used to solve electro–magnetic field in the plane.

CONSULTATION SYSTEM FOR INSULINOTHERAPY OF DIABETES MELLITUS

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(29.6.1989)

The self–learning system to propose insulin therapy was developed. It is supposed to be used as a consultation system to assist the physician's decision making. The mathematical model of insulin pharmacodynamics is the main part of the system. All conventional injection therapy schemes including insulin pump treatment are supported. The parameters of the model are learned continuously during the therapy process. The methods of linear regression analysis modified with heuristic rules are used to perform the adaptation. The system proposes suitable therapy according to the individualized model. Generally, it is a combinatorical problem