rate allows the possibility of avoiding the shortcomings of modelling and increasing its usefulness. Morinaga (1990) chose this approach for prediction of service life of reinforced concrete structures.

Jambor's method also belongs to the category of mathematical modelling exclusively based on experimental results (Jambor *et al* 1983). According to this method the degree and rate of deterioration of concrete can be expressed as a product of functional relations, which themselves express the influence of the individual factors of destruction processes. The method represents an open system, which enables the gradual completion of the functional relations product. This is a significant point for preference of the method, because it enables increasing the capability for various circumstances that occur in practice.

It is assumed that for the utilization of the method in practice, at least a knowledge of the influence of the most important factors of deterioration process and its rate and the expression of their influence in corresponding functional relations are required.

The significance of corrosion of steel reinforcement in the service life of reinforced concrete is indisputable. For prediction of service life of reinforced concrete also several mathematical models have been developed. These models take into consideration the depassivation rate expressed by the penetration rate of aggressive substances—chlorides, CO_2 or other aggressive gases—through the concrete cover to the reinforcement surface (Grunau 1970; Alekseev 1978). These models allow determination of the approximate time of depassivation of reinforcement or the initiation of its corrosion. However, information about the actual state of the reinforcement and corrosion rate is missing. This is an important shortcoming.

Knowledge of the character of reinforcement corrosion enables for its quantitative description and expression of corrosion rate a realistic parameter which represents the quantity of corroded steel. This parameter enables determination of a significant criterion for the state of reinforcement, the value of cross-section decrease of reinforcement, which represents an important parameter for evaluation of the service life of reinforcement concrete.

In connection with mathematical modelling and prediction of service life of reinforced concrete, attention is being increasingly paid to the utilization of electrochemical methods. On the basis of results with the so-called electrochemical cell a model of a two-step mechanism has been developed by Tuutti (1971) for corrosion of reinforcement steel in concrete.

The object of this paper is an attempt to model the rate of concrete reinforcement corrosion mathematically on the basis of experimental results.

2. Experimental

Mortar prisms 40 mm × 40 mm × 60 mm with embedded corrosion sensors for the improved method of electrical resistance measurement (IER method) were used for the study. The method was improved by developing a so-called "corrosion sensor". This sensor is embedded in the cement composite test specimen or in the concrete structure and enables one to check the condition of reinforcement. The structure of the sensors excludes disturbing effects during the measurement and increases the sensitivity of the method and the reliability of the test results. The method is described in detail elsewhere (Živica 1993).