

A Numerical Description of a Fibre Reinforced Concrete Using a Genetic Algorithm

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Abstract : This work reports about an approach for an automatic adaptation of concrete formulations based on genetic algorithms (GA) to optimize a wide range of different fit-functions. In order to achieve the goal, a method was developed which provides a numerical description of a fibre reinforced concrete (FRC) mixture regarding the production technology and the property spectrum of the concrete. In a first step, the FRC mixture with seven fixed components was characterized by varying amounts of the components. For that purpose, ten concrete mixtures were prepared and tested. The testing procedure comprised flow spread, compressive and bending tensile strength. The analysis and approximation of the determined data was carried out by GAs. The aim was to obtain a closed mathematical expression which best describes the given seven-point cloud of FRC by applying a Gene Expression Programming with Free Coefficients (GEP-FC) strategy. The seven-parametric FRC-mixtures model which is generated according to this method correlated well with the measured data. The developed procedure can be used for concrete mixtures finding closed mathematical expressions, which are based on the measured data.

Keywords : concrete design, fibre reinforced concrete, genetic algorithms, GEP-FC

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