

INVESTIGATION OF CASE-BASED SIMILARITY AND LIGHT-WEIGHTING ANALYSIS OF DOOR-SHAPED STRUCTURE

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ABSTRACT. *Based on use of the concept of knowledge framework, this paper performs the classification of engineering knowledge framework and examines the feasibility of using the relativity of classified hierarchical knowledge to establish a relational engineering knowledge base for a door-shaped structure. Hierarchical analysis is also performed of agent techniques, which are correlated with important engineering knowledge and related parameters, to establish an engineering knowledge coding for a door-shaped structure. Various boundary conditions and loading range as well as the coding of related detailed parameters are established in a proper order to solve analytic problems of natural frequency or stress of the transverse beam. According to the existing coding model, decoding can be done rapidly for making general calculations based on engineering principles. Additionally, detailed parameter coding is performed via a detailed parameter agent. The most similar cases can be located from the database by using the case-based similarity agent and the corresponding structural target parameters of the detailed codes. Moreover, an information search and comparison of results are made based on the similarity of cases, thus shortening the time of data retrieval, and obtaining inferential and analytical results efficiently for a subsequent evaluation and applications. Furthermore, a novel concept is adopted, in which the analytical results are taken from a case-based similarity agent as the foundation for further evaluation. The concept is also combined with a genetic algorithm to perform light-weight calculations to obtain the optimal design and provide engineers with a rational design. The proposed framework of the knowledge system adopts JAVA language and combines with MySQL software and C++ program to facilitate the construction and application of a related program interface, knowledge coding and case-based similarity. The above proposed method for case-based similarity and light-weight analyses can be extended to apply other similar structures.*

Keywords: Door-shaped structure, Engineering knowledge coding, Engineering knowledgebase, Case-based similarity, Light-weight

1. Introduction. The conventional trial-and-error calculation model has difficulty in acquiring valid results quickly, subsequently increasing the time spent on design. The evolution of computers in terms of processing speed has significantly advanced calculation and presentation capabilities. Additionally, advances in network technology and knowledge engineering has made more feasible in the integration of structural design, analysis and professional knowledge. The ability to integrate previous analytical results and design experience with engineering knowledgebase to formulate an acceptable design mode would increase the efficiency of design analysis, ultimately enhancing engineering practices.

In traditional design, knowledge is dispersed, implying an operational procedure without the assistance of an information agent. Combining a knowledge coding system with