衝撃などの偶発荷重による構造破壊と耐衝撃性能設計

2004 Fiscal Year Final Research Report Summary

The failure of structure by incidental impact load and the design method of structure under impact

Research Project

Project/Area Number

15560403

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Structural engineering/Earthquake engineering/Maintenance management engineering

Research Institution

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Project Period (FY)

2003 – 2004

Keywords

Impact / Concrete structure / Failure / Performance design / Shock absorbing material / Rock shed

Research Abstract

In this research, a series of research on the application of the numerical simulation to the impulse kill of a structural material by the clarification of a hard impulse kill of the material and the impulse kill of a soft material and the individual element methods, etc. was done. The outline is brought together as follows.
1.Failure of member by hard impact
We achieved static experiments of various concrete members to compare with impact behaviors before achievement of the failure experiments by hard impact failure mode. Energy required for failure from the load displacement relations of static experiment under various concrete members were examined in detail. Afterwards, a

destruction form, penetration energy, crack area, and structural impact behavior etc. were examined using a heavy weight with an impact experiment device and the basic data for the evaluation type examination of the coming flying thing of the RC structure was presented.
2.Failure of member by soft impact
We carried out series of static and relatively soft impact tests utilizing shock-absorbing materials (sand and r rubber.) on the collision point between concrete member and weight. Characteristics of these failures and shock absorbing ability have bee made clear. Moreover, the method of evaluating the impact failure of a concrete material comparing with a hard impact was examined.
3.Application of distinct element method to the numerical simulation of impact failure
We applied distinct element method to failure of concrete structure that is effective for analysis of discontinuous body like the grainy bodies. We also developed it perforation of concrete plate. Method using cylinder element was concretely shown for two dimensions problem, and an analytical method on which three dimension elements depended was also developed. It has been shown that it is very effective to not only the elasticity problem but also the plasticity impact problem for the plate structure.

Research Products (11 results)

All | 2004 | 2003

All | Journal Article

- [Journal Article] 衝撃を受けるRCはりのDEMによる解析に関する一考察 — 2004
- [Journal Article] Numerical simulation of a concrete plate subjected to impact load — 2004
- [Journal Article] 有限要素法(ADINA)によるRCはり衝撃挙動解析に関する研究 — 2004
- [Journal Article] A study on the analysis of reinforced concrete beams under impact by distinct element method — 2004
- [Journal Article] Numerical simulation of a concrete plate subjected to impact load — 2004
- [Journal Article] A study on analysis of impact behavior of reinforces concrete beam by finite element method (ADINA) — 2004
- [Journal Article] A study on the impact test method and characteristics of impact behavior of various reinforced concrete beams — 2003
- [Journal Article] Parametric study of impact characteristics of reinforced concrete beams by the analysis of distinct element method — 2003
- [Journal Article] Round Robin analysis of RC beam subjected to impact load due to falling weight — 2003
- [Journal Article] A study on the impact test method and characteristics of impact behavior of various reinforced concrete beams — 2003
- [Journal Article] Round Robin analysis of RC beam subjected to impact load due to falling weight — 2003

URL: https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-15560403/155604032004kenkyu_seika_hokoku_

Published: 2006-07-10