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Structural Health Monitoring of Concrete Structure by Non Distructive Evaluation

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Abstract: Day to day we see various defects and problems in our structures like cracks ,honeycombing, settlement and displacement, deformation and so on which is directly responsible for the lifespan of structure. But we really aware of about our structure conditions? We really need to monitor the health of our structures? Anyone curious about what exactly causes of these defects? Yes! Structural health monitoring is very necessary and essential in these days. In these polluted world ,various causes are responcible for structural deteriotions.

Structural health monitoring ensure the quality and structure life span. Structural health monitoring is nothing but monitor or investigate the change occurs in the structure which help the understand compressive strength of material. Then how to monitor structure ? Yes it is possible without distruction of building, which is using non distructive testing evaluation. in civil engineering various NDT has like rebar hammer, ultrasonic velocity ,carbonation test and half cell potentionmeter

Keywords: Non-Destructive Evaluation, Structural Health Monitoring, Columns, Steel, Composite Sections of concrete & compressive Strength, stress-strain relations, strength determination, Concrete damage detection

REFERENCES

- [1]. BS1881:Part 201:1986 Guide to the use of non destructive methods of test for hardened concrete
- [2]. BS1881:Part 203:1986 Recommendations for measurement of velocity of ultrasonic pulses in concrete
- [3]. BS1881:Part 207:1992 Recommendations for the assessment of concrete strength by near-to-surface tests
- [4]. IS 13311 : Part 1 :1992 NDT of Concrete Method of test UPV
- [5]. IS 13311 : Part 2 :1992 NDT of Concrete Method of test Rebound Hammer
- [6]. IS 456 2000 Plain & RCC Code of Practice
- [7]. IS 1199 1959 Method of sampling & Analysis of Concrete
- [8]. IS 516 1959 Methods of tests for Strength of Concrete
- [9]. ACI SP 82 In Situ / Non Destructive Testing of Concrete
- [10]. ACI 311.4 4R-00 Guide for Concrete Inspection
- [11]. ACI 365.1 R-00 Service life Prediction State of Art ReportACI 214.4 R-03 Guide for obtaining Cores & Interpreting Compressive strength results.
- [12]. ACI 228.2 R-98 NDT Methods for Evaluation of Concrete in Structures
- [13]. ACI 228.1 R-03 In-Place Methods to Estimate Concrete Strength
- [14]. ACI 437 R-03 Strength Evaluation of Existing concrete buildings
- [15]. ACI SP 168 Innovations in NDT of concrete
- **[16].** ACI SP 112 NDT
- [17]. ACI Monogram No 9 Testing of Hardened concrete NDT methods
- [18]. ACI Monogram Series Evaluation of Concrete Properties from Sonic Tests
- [19]. Malhotra V. M. (Ed.) Testing Hardened Concrete: Non-destructive Methods, ACI, monograph No. 9, Detroit, US, 1976.
- [20]. Malhotra V. M. Handbook of NDT of concrete Second Edition

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- [21]. J. H. Bungey The Testing of Concrete in Structures
- [22]. N. J. Carino NDE to Investigate Corrosion status in Concrete Structures
- [23]. P.A.M. Basheer Near Surface Testing for strength & Durability of Concrete
- [24]. R. Halmshaw NDT Second Edition
- [25]. H. W. Reinhardt Testing during Concrete Construction
- [26]. Periodical Structural Inspection of Existing Buildings Building & Construction Authority Singapore
- [27]. Guidelines for Structural Audit , Assessment . Evaluation and Strengthening of Existing buildings Structures Indian Association of Structural Engineers
- [28]. D. Breysse —Nondestructive evaluation of concrete strength: An historical review and a new perspective by combining NDT methods || , Elsevier 19th December 2011.
- [29]. Ha-Won Song and VeluSaraswathy, -Corrosion Monitoring of Reinforced Concrete Structures A Review ||, International journal of Electrochemical of science, 1st Jun
- [30]. KatalinSzilágyi ,AdorjánBorosnyói, IstvánZsigovics Rebound surface hardness of concrete.
- [31]. A. V. Malhotra, Editor, Testing Hardened Concrete: Non-destructive Methods, ACI, Detroit, US(1976) monograph No. 9.
- [32]. A. Leshchinsky, Non-destructive methods Instead of specimens and cores, quality control of concrete structures. In: L. Taerwe and H. Lambotte, Editors, Proceedings of the International Symposium held by RILEM, Belgium, E&FN SPON, UK (1991), pp. 377–386.
- [33]. ASTM C 805-85, Test for Rebound Number of Hardened Concrete, ASTM, USA (1993).
- [34]. BS 1881: Part 202, 1986: Recommendations for Surface Hardness Tests by the Rebound Hammer, BSI, UK (1986).
- [35]. In Place Methods for Determination of Strength of Concrete; ACI Manual of Concrete Practice, Part 2: Construction Practices and Inspection Pavements, ACI 228.1R-989, Detroit, MI (1994) 25 pp..
- [36]. T. Akashi and S. Amasaki, Study of the stress waves in the plunger of a rebound hammer at the time of impact. In: V.M. Malhotra, Editor, In situ/Nondestructive Testing ofConcrete, ACISP-82, Detroit (1984), pp. 19–34.
- [37]. S. Amasaki, Estimation of strength of concrete structures by the rebound hammer. CAJ ProcCem Conc 45 (1991), pp. 345–351.
- [38]. W. Grieb. In: Use of the Swiss Hammer for Estimating the Compressive Strength of HardenedConcrete, FHWA Public Roads 30 (1958), pp. 45–50 Washington, DC, No. 2, June.
- [39]. C. Willetts. Investigation of Schmidt Concrete Test Hammer, Miscellaneous Paper No. 6-267,
- [40]. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS (1958) June.
- [41]. A. Neville and J. Brooks. Concrete Technology, Longman, UK (1994).
- [42]. G. Teodoru, The use of simultaneous nondestructive tests to predict the compressive strength of concrete. In: H.S. Lew, Editor, Nondestructive Testing vol. 1, ACI, Detroit (1988), pp. 137–148 ACI SP-112.
- [43]. A. Neville. Properties of Concrete, Addison-Wesley Longman, UK (1995).
- [44]. ASTM C 597-83 (Reapproved 1991), Test for Pulse Velocity Through Concrete, ASTM, USA(1991).
- [45]. BS 1881: Part 203: 1986: Measurement of Velocity of Ultrasonic Pulses in Concrete, BSI, UK (1986).
- [46]. A. Nilsen and P. Aitcin, Static modulus of elasticity of high strength concrete from pulse velocity tests. Cem Concr Aggregates 14 1 (1992), pp. 64–66.
- [47]. R. Philleo, Comparison of results of three methods for determining Young's modulus of elasticity of concrete. J Am Concr Inst 51 (1955), pp. 461–469 January.
- **[48].** M. Sharma and B. Gupta, Sonic modulus as related to strength and static modulus of high strength concrete. Indian Concr J 34 4 (1960), pp. 139–141.
- [49]. ACI 318-95, Building Code Requirements for Structural Concrete (ACI 318-95) and Commentary-ACI 318R-95, ACI, USA (1995) 369 pp..
- [50]. E. Whitehurst, Soniscope tests concrete structures. J Am Concr Inst 47 (1951), pp. 433–444 Feb..

DOI: 10.48175/IJARSCT-12922



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International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

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[51]. R. Jones and E. Gatfield. Testing Concrete by an Ultrasonic Pulse Technique, DSIR RoadResearch Tech. Paper No. 34, HMSO, London (1955).

