

徳山工業高等専門学校校外発表論文, 学術講演,

著書, 分担執筆など

(平成 27 年・9・6~平成 28 年・9・5)

## 論 文

### BEHAVIOUR OF R/C COOLING TOWER SHELL UNDER LATERAL LOAD ON NON-UNIFORM FOUNDATION

17th IAHR International Conference on Cooling Tower and Heat Exchanger

Vol.1, pp1-10

Takashi HARA

#### **Abstract:**

The stress distributions and the ultimate strength of a reinforced concrete (R/C) cooling tower shell under a self weight and a lateral wind load were investigated under the conditions on non-uniform foundation. The construction site of the cooling tower is quite huge and the site may have different bearing capacities within location by location. Therefore, to design such structures, the effects of uneven settlements of supporting system due to the non-uniform foundation should be considered. In modeling the cooling tower, the height of the shell was about 160m and the radius at the lintel was about 60m. From the numerical analysis, the stress concentration was arisen near the connections between the unsettled column and the lintel and the ultimate strength was reduced by the uneven settlement depend on the wind direction. The foundation beam plays an important role to transfer the stresses.

### Application of Steel Sheet to the Scaffold Elements

8th ISSS2015

Vol.1 pp 173-174

Takashi Hara

#### **Abstract:**

The toe boards are applied for workers and constructional materials on a scaffold deck to

lateral load from the scaffold deck or the load perpendicular to the scaffold deck. The proposed toe boards were examined numerically by use of the finite element method. Then the experimental works were done. From both numerical and experimental results, the performance of the thin steel toe board proposed here was confirmed.

### STRUCTURAL BEHAVIOR OF R/C SHELL CONSIDERING THE POSITION OF EDGE BEAM

ISEC08

Vol.1 pp 299-304

TAKASHI HARA

#### **Abstract:**

Reinforced Concrete (R/C) shell has been constructed to cover large public spaces and large industrial buildings. RC shell is originally a continuous structure and shows the large load bearing capacity. To apply these structures to such purpose, the structure is cut at any particular portion and loses their continuum properties. Therefore, edge beams must be placed to avoid the stress concentration and a local failure. In this paper, R/C cylindrical shell with edge beam on meridional free edges was analyzed by use of FEM. RC shell had 960 x 960 mm plan and the thickness was 10 mm. The radius and the depth of the shell were 688 mm and 190 mm, respectively. As the edge beam, three kinds of rectangular beams, which had 2 cm width and 4 cm depth, were arranged. One was connected to the shell at the gravity center of the beam and the others were connected at the bottom or the top of the beam. From the numerical analyses, the deformation and the stress distribution of the shell mentioned above were analyzed precisely. The shell connected with the gravity center of the beam showed the smooth deformation and the stress distributions.

Dynamic response property of cooling tower structures

**Abstract:**

Reinforced concrete (R/C) cooling tower structures have been used for cooling down the hot water produced by power or chemical plants. These structures are designed to prevent against the failure under a self-weight and a wind loading, as well as an earth-quake loading. In this paper, the numerical scheme under parallel processing is introduced and the dynamic evaluation of the cooling tower under an earthquake loading is examined. In numerical analyses, the cooling tower is assumed to have two types of conventional column system, i.e., V-column and I-column systems. Both R/C shell portion and column system are modeled by use of solid elements. From the numerical analyses, the higher stress concentrations are arisen between the junctions of R/C shell and columns for I-column than those for V-column. Also, it is concluded that the additional reinforcements should be placed around the junction considering the seismic effects.

Structural Behavior of Reinforced Concrete Shell with Stiffener under Pressure

Proc. of The Fifth Intl. Conf. On Advances in Civil and Structural Engineering - CSE 2016

Vol.1 , pp 13-16

Takashi Hara

**Abstract:**

Reinforced concrete cylindrical shell with edge beam on meridional free edges was analyzed by use of FEM. As the edge beam on meridional edge, three kinds of rectangular beams were arranged. One was connected to the shell at the gravity center of the beam and the others were connected at the bottom or the top of the beam. The model was supported at four corner of R/C shell. Applied load was the external pressure. From the numerical analyses, the shell connected with the top of the beam showed the smooth deformation and the stress distributions as well as the highest

load carrying capacity.

Behaviour of R/C Cooling Tower Shell under Uneven Foundation Settlement

Journal of IASS

Vol. 57(1), pp 59-66

Takashi Hara

**Abstract:**

Reinforced concrete cylindrical shell with edge beam on meridional free edges was analyzed by use of FEM. As the edge beam on meridional edge, three kinds of rectangular beams were arranged. One was connected to the shell at the gravity center of the beam and the others were connected at the bottom or the top of the beam. The model was supported at four corner of R/C shell. Applied load was the external pressure. From the numerical analyses, the shell connected with the top of the beam showed the smooth deformation and the stress distributions as well as the highest load carrying capacity.

Analysis of Hagia Sophia using Nondestructive Measurement

Proceedings of EURO-MED-SEC1

Vol.1 pp 199-204

Takashi Hara, Kenichro Hidaka

**Abstract:**

In this paper, the structural behavior of Hagia Sophia was analyzed by use of vibration records of the structure. The vibration records were measured by the micro tremor meters. The recorded data was utilized not only to define the mode shape but also to evaluate the structural problems. Firstly, the vibration characteristics of the main building were analyzed by combining the vibration records. Secondly, the deformation characteristics and the structural functions of the second cornice were investigated in the same manner as the main building. In case of main building, from the frequency domain analyses, the natural frequency of the main building was analyzed and the obtained natural frequencies were compared with the results of the previous researches. The vibration modes were investigated as well. From these results, the

characteristics of the total structure were clarified and the structural problems were detected. In case of the second cornice, the base at the corner where was the junction of the main pier and the sub-dome connecting to the semi-dome showed the movement of the embedded stone. To investigate such phenomena, the same non destructive measurements were applied. Then, applying the finite element method to solve such structures, the structural behaviors were clarified and the health monitoring was performed.

Numerical analysis of R/C cylindrical shell with hoop edge beams  
Proc. of SCESCM2016  
Vol.1 pp1-8  
Takashi HARA

**Abstract**

In this paper, the numerical analysis of the reinforced concrete (R/C) cylindrical shell with hoop edge beams was performed by using the nonlinear finite element method. R/C shell with free edges must be stiffened by the edge beam. From the numerical results of the previous papers, the minimum size of the edge beam was placed on both hoop edges as the beam having the maximum ratio of the strength to the weight. There were several connecting method between R/C cylindrical panel and the hoop edge beam. Three kinds of connecting position between R/C shell and the edge beam were considered. One was the concentric connection of R/C shell and the beam (Type C). The second one was the shell connected at the top of the beam (Type L). The third one was the shell connected with the bottom of the beam (Type U).

Structural characteristics of Hagia Sophia under consideration of the ribs inside the dome  
Proc. of SCESCM2016  
Vol.1 pp1-6  
Akito Oto, Takashi Hara

**Abstract**

In this study, the numerical analyses of Hagia Sophia,

modeled by the shell and the ribs, were performed to clarify the structural characteristics of the main dome considering the displacements and the stresses in the dome with and without 40 ribs. In numerical analysis, tetrahedral secondary elements were adopted to model the structure. From the numerical results, the maximum displacement of dome with ribs was smaller than that without ribs. Therefore, ribs were effective to prevent the dome deformation. The equivalent stress in dome with ribs is smaller than that without ribs. The ribs were also effective to reduce the stresses of the dome between the openings.

Load carrying capacity of an arch subjected to the load in one half  
Proc. of SCESCM2016  
Vol.1 pp1-7  
Takuya Tuyama, Takashi Hara

**Abstract**

In this paper, prior to the structural analysis of R/C shells, the loading tests of R/C arch were performed. Considering the melting of snow on south side of the roof, an applied load was only one half of the arch. In addition, the loading direction was vertical due to the snow loading. R/C arch specimens were tested under the load in one half of the arch span. R/C arches were pin supported at both ends. To represent the distributed load, point loads were applied to the several equidistant points. As the results of experiments, the more the loading points were, the larger the ultimate strength grows independent of the height of arch rise. The ultimate strength of a deep arch was larger than that of a shallow arch.



# 学 術 講 演

○印講演発表者

講 演 者	演 題	発 表 機 関	年 月 日
○ 西 田 周 泰 寒 竹 司 大 木 順 司 陳 猷 献 櫻 本 逸 男	脊椎後縦靱帯骨化症における脊髄圧迫有限要素法モデルを用いた解析	第 42 回日本臨床バイオメカニクス学会	2015. 11. 13
○ 伊 藤 早 紀 大 木 順 司 陳 猷 献 櫻 本 逸 男	脊椎の圧迫骨折に関する数値解析	第 42 回日本臨床バイオメカニクス学会	2015. 11. 13
○ 水 津 優 大 木 順 司 櫻 本 逸 男 陳 猷 献 西 田 周 泰 田 口 敏 彦	脳各部位の材料特性を考慮した脳三次元有限要素モデルの構築と頭部衝撃シミュレーション	日本機械学会第 28 回バイオエンジニアリング講演会	2016. 01. 09
○ 内 田 真 平 櫻 本 逸 男 大 木 順 司 陳 猷 献 西 田 周 泰	脳と脊髄の材料特性の異方性	日本機械学会中国四国支部 第 54 期総会・講演会	2016. 03. 09
○ 福 田 明 石 田 士 潮 田 拓 海	CMP におけるウェーハ・研磨パッド間スラリー流れの可視化 (第 2 報) - パッド摩耗の影響の可視化に関する試み-	2016 年度精密工学会春季大会学術講演会	2015. 03. 15-17
○ 松 村 俊 孝 古 賀 崇 了 百 田 正 広	RGB-D カメラから得られた実画像と拡張現実の融合による部屋の模様替えシステムの作成	平成 27 年度 (第 66 回) 電気・情報関連学会中国支部連合大会講演論文集 p.22-2	2015. 10. 17
○ 久 本 純 樹 義 永 常 宏 坂 本 眞 人	全称状態のみの 1 方向交代性マルチプロセッサ有限オートマトン	平成 27 年度 (第 66 回) 電気・情報関連学会中国支部連合大会	2015. 10. 17
○ 津 山 拓 也 原 隆	半載荷アーチの耐荷力特性	日本建築学会中国支部	2016. 03. 06

講演者	演題	発表機関	年月日
○ 大藤 昭人 原 隆	ハギア・ソフィア大聖堂ドーム部分のリブを考慮した構造特性	日本建築学会中国支部	2016. 03. 06
○ 井本 琢哉 中村 金良 奥本 幸 石川 善丈 久保田 絢香 林 嘉雄 藤本 竜也 鳥居 恵子 大橋 正夫 藤本 浩 小林 明伸 小重 村哲至 西尾 幸一郎	小学生を対象とした安全な先端技術講座の実施例	平成28年度全国高専フォーラム	2016. 08. 25
○ Atsuyuki SUZUKI Shota IKEOKA Jiromaru TSUJINO	Downsizing of Impact-reduction Device Using Ultrasonic Transducer	The 36 <sup>th</sup> Symposium on Ultrasonic Electronics	2015. 11. 07
鈴木 厚行 ○ 木村 開 西村 太志 辻野 次郎丸	超音波振動を炭素繊維強化プラスチックに印加したときの衝撃軽減効果	日本音響学会 2016 年春季研究発表会	2016. 03. 09
○ 大橋 正夫	Preparation and Ion Exchange of Layer Structured Tantalate $Rb_4Ta_6O_{17} \cdot 3H_2O$	日本化学会第96 春季年会	2016. 03. 25
○ 柏倉 知秀	14 世紀後半リュウベックのバルト海商業—プロイセンを中心に	国際商業史研究会	2015. 11. 22
○ 柏倉 知秀	14 世紀後半リュウベックのバルト海商業—穀物貿易を中心に	日本ハンザ史研究会	2016. 07. 09