Hollow energy storage concrete ball

Development of structural-functional integrated energy storage concrete with innovative macro-encapsulated PCM by hollow steel ball H. Cui Waiching Tang Qinghua Qin F. Xing Wenyu Liao Haibo Wen Engineering, Environmental Science

The application of thermal energy storage with phase change materials (PCMs) for energy efficiency of buildings grew rapidly in the last few years. In this research, octadecane paraffin was served as a PCM, and a structural concrete with the function of indoor temperature control was developed by using a macro-encapsulated PCM hollow steel ball (HSB).

Development of structural-functional integrated energy storage concrete with innovative macro-encapsulated PCM by hollow steel ball Hongzhi Cuia, Waiching Tangb, Qinghua Qinc, Feng Xinga,?, Wenyu Liaoa, Haibo Wena a Guangdong Provincial Key Laboratory of Durability for Marine Civil Engineering, College of Civil Engineering, Shenzhen University, Shenzhen ...

19) Zhijun Dong, Hongzhi Cui, Waiching Tang, et al. Development of Hollow Steel Ball Macro-Encapsulated PCM for Thermal Energy Storage Concrete, Materials, Vol. 9, 1, 2016. 20) Wei Liu, Hongzhi Cui, Zhijun Dong, Feng Xing, Haochuang Zhang, Tommy Y Lo; Carbonation of concrete made with dredged marine sand and its effect on chloride binding ...

The hollow steel ball (HSB) was selected as a carrier to encapsulate PEG-600 for the preparation of PCM-HSB (shown in Fig. 2). The parameters of HSB are shown in Table 2. HSB was drilled by a 2.5 mm diameter bit in a non-weld position. ... This study obtained a new phase-change energy storage concrete using steel balls encapsulated with PEG-600 ...

Concrete with macro-encapsulated octadecane-HSB was capable of reducing the peak indoor air temperature and the fluctuation of indoor temperature and can be very effective in transferring the heating and cooling loads away from the peak demand times. The application of thermal energy storage with phase change materials (PCMs) for energy efficiency of buildings grew rapidly in ...

Memon [15,17] developed thermal energy storage concrete by incorporating PCM in porous lightweight aggregates (LWAs). Thermal energy storage aggregates were prepared with a vacuum impregnation technique. It was found that porous aggregates and PCM are chemically compatible and have large thermal energy storage density.

The thermal energy storage system is divided into active and passive systems [6].The active one is characterized by forced heat exchange accompanied by fans or pumps, which stores thermal energy in the medium through a heat exchanger [7].A passive thermal storage system effectively utilizes ambient thermal

energy, absorbs and releases heat, to ...

Phase change materials (PCMs) have great potential for applications in energy efficient buildings. In this study, an innovative method of macro-encapsulation of PCM using hollow steel balls (HSB) was developed and the thermal and mechanical performance of PCM-HSB concrete was examined. The macro-encapsulation system (PCM-HSB) was attached with a metal clamp (c) ...

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2015, Ji et al. [4] used hollow steel balls with high thermal conductivity and high absorption rate as carrier materials to absorb the octadecane, and combined them with concrete materials to prepare a new type of phase change energy storage concrete. In ...

upper part of steel balls, and then the balls were filled with cement slurry. After the cement slurry had dried slightly, the total mass of the hollow steel ball and the cement slurry was weighed to obtain a density of 2439 kg/m3 for the grouting steel ball. 2.3. Preparation of Concrete Mixed with Phase Change Steel Balls

The development of structural-functional integrated energy storage concrete with innovative macro-encapsulated PCM by hollow steel ball involves incorporating phase change materials (PCMs) into concrete structures to improve their energy storage capabilities.This is achieved by using hollow steel balls as macro-encapsulation agents for the ...

@article{Bu2021LowHE, title={Low hydration exothermic well cement system: The application of energy storage microspheres prepared by high-strength hollow microspheres carrying phase change materials}, author={Yuhuan Bu and Rui Ma and Huajie Liu and Chuanhua Ma and Xuezhan Zhao}, journal={Cement & Concrete Composites}, year={2021}, volume={117 ...

Meeting the majority of energy need in buildings from conventional energy sources brings up problem of global warming as a result of carbon emissions [1].Enhancing energy efficiency of structures with thermal energy storage is one way to reduce this issue [2].Therefore, several researchers have concentrated on employing phase change materials to ...

Development of structural-functional integrated energy storage concrete with innovative macro-encapsulated PCM by hollow steel ball. Appl. Energy (2017) A. D"Alessandro et al. Multifunctional smart concretes with novel phase change materials: mechanical and thermo-energy investigation.

1. Introduction. Concrete is an important and versatile building material in every area of construction worldwide. The large thermal mass of normal-weight aggregate concrete (NWAC) buildings can be advantageous, especially in moderate climates where it can be used to store energy during the day and release

it during the night, thus reducing the requirement for ...

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The purpose of this work is to utilise paraffin/alumina hollow spheres and slag to develop a novel thermal energy storage composite (TESC) with an FSPCM mass fraction of up to 80% and latent heat of up to 19.18 J/g, which are all greater than those in ...

In 2015, Ji et al. [4] used hollow steel balls with high thermal conductivity and high absorption rate as carrier materials to absorb the octadecane, and combined them with concrete materials to prepare a new type of phase change energy storage concrete.

Energy piles are a new renewable energy technology that is suitable for use as a heat exchanger in ground source heat pump systems this study, hollow steel balls macro-encapsulated phase change materials (PCMs) were used for the development of concrete pile, the resulting pile is referred to as the "PCM energy pile." A laboratory-scale PCM energy pile in ...

Development of structural-functional integrated energy storage concrete with innovative macro-encapsulated PCM by hollow steel ball. ... mechanical properties and numerical simulation of macro encapsulated thermal energy storage concrete. H Cui, SA Memon, R Liu. Energy and buildings 96, 162-174, 2015. 148: 2015: Strength analysis of bamboo by ...

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