

RESEARCH PROGRESS ON THE APPLICATION OF ROAD RECYCLED AGGREGATES

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Abstract: Compared with other recycled aggregates, road recycled aggregates have a single source, stable performance, and can be reused. After being mixed with cement, they can form stable aggregates and are widely used in practical projects. At present, a large number of studies have shown that the appropriate amount of road recycled aggregate can improve the performance of road recycled concrete. At the same time, reasonably graded road recycled aggregate can partially or completely replace the natural aggregate recycling application. for road works. However, there is a lack of systematic review and summary of literature on road regeneration. Aggregate properties and their applications. This article is based on the recycling technology of road recycled aggregate, In terms of research status, performance and road application prospects, the existing literature is reviewed and analyzed to provide reference and reference for further research.

Keywords: Road recycled aggregate; Road recycled concrete; Recycling technology; Road application Use prospects

1. FORWARD WORD

In recent years, with the acceleration of urbanization, the demand for concrete has increased rapidly. Increase, based on rational development and utilization of resources and sustainable development strategies, looking for natural Aggregate alternatives have become an urgent task [1].

In order to promote the application of road recycled aggregates in new pavement structures, domestic Some scholars have conducted research on the performance of recycled aggregate concrete and have achieved certain results. Achievements [2-4]. In addition, research on recycled aggregate road technology has also been put on the agenda. Procedure. As shown in the Figure 1 As shown, my country's "road regeneration Aggregate" literature in twenty one century has gradually increased. In order to keep up with the country's "Thirteenth Five-Year Plan" According to the planned construction blueprint, research on the use of road recycled aggregates is imminent[5].

This article reviews the research progress and performance of road recycled aggregates in recent years, and The problems existing in current research are further discussed, and the application of recycled aggregates in roads is proposed. The application prospects in this aspect provide reference for the practical application of road recycled aggregates. and reference.

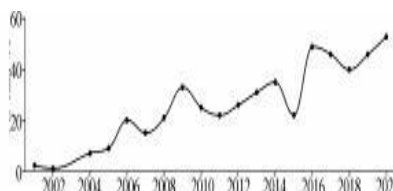


Fig. 1 Annual trend chart of literature publication on " Road Recycled Aggregate " on China National Knowledge Infrastructure

2. RESEARCH PROGRESS OF ROAD RECYCLED CONCRETE

Compared with ordinary aggregate, road recycled aggregate has low strength and high water absorption rate. and low apparent density. [7-9], Its incorporation into concrete can affect concrete working performance [10-12], mechanical properties [1, 5-6] and durability performance [5, 13-14].

2.1 Work Performance

The high water absorption rate of road recycled aggregate is an important factor affecting the working performance of concrete, Liu Yaping [10] Tests show that using natural sand as fine aggregate Road recycled aggregate is used as coarse aggregate to prepare recycled concrete, and its water consumption is higher than that of ordinary Concrete increases approx. 5% ;When recycled pavement aggregate serves as both fine aggregate and coarse aggregate. When feeding, water consumption increases by about 15%. Hou Jinru et al. [11] found that recycled aggregates are harmful to the weather However, when the aggregate replacement rate is 60%, its slump is basically the same as that of ordinary concrete. same. When the recycled aggregate replacement rate is 60%, the concrete slump loss is small and the Will cause difficulties in concrete construction. When the replacement rate of recycled concrete is greater than At 70%, its slump will be significantly reduced.

In addition, Su Linxing et al. [12] Prepared from waste concrete from road construction waste Regenerated coarse aggregate and recycled fine aggregate are prepared by replacing natural aggregate with different replacement rates. recycled concrete. The results show that the workability of double-mixed recycled aggregate concrete is obvious. Worse than natural aggregate concrete. In order to improve the workability of double-mixed recycled aggregate concrete be improved, its water consumption will inevitably increase. As the replacement rate of recycled aggregate increases In addition, the water consumption of double-mixed recycled aggregate concrete shows an increasing trend, but both have good linear relationship. When the replacement rate of recycled fine aggregate reaches 50 % or the recycled coarse aggregate The aggregate replacement rate reaches At 75%, the increasing trend slows down, and double-mixed recycled aggregate coagulation Soil water consumption increases and decreases.

2. 2 Mechanical Properties

The low strength of recycled pavement aggregate is an unfavorable factor affecting the performance of recycled concrete. One of the factors, Wang Xinwei et al. [5] studied the use of 5 at different replacement rates ~ 10 mm road Compressive strength and splitting of mixed aggregates when road recycled coarse aggregate replaces natural coarse aggregate strength and flexural strength. The compressive, tensile, and flexural strength curves of recycled concrete also show the same trend. As the content of recycled aggregate increases, the mechanical properties of recycled concrete first decrease and then increase. The main reason can be It is possible to add an appropriate amount of recycled aggregate to fresh concrete because of its high water absorption. rate, reducing the local water-cement ratio of concrete, but increasing the strength of concrete. The results show that an appropriate amount of recycled aggregate can improve the compressive strength, Mechanical properties such as tensile strength and flexural strength. O 'Mahony [6] By studying the shear strength of recycled aggregate concrete for roads An experimental study was conducted and found that the shear strength of recycled aggregate concrete meets the requirements of concrete shear resistance requirements. The results show that changing the strength of recycled concrete cement mortar can To improve the performance of recycled concrete pavements.

2. 3 Durability

Recycled aggregate for roads also has a certain impact on the durability of concrete, Ilker wait [13] Prepare 30%,50%,70% and 100% Road recycled aggregate content Recycled concrete, and conduct the physical and mechanical properties of road recycled concrete and its relationship with Study on freeze-thaw durability. The results show that below 30% Amount of C14 waste coagulation

Soil recycled aggregate can be used to prepare C16 strength concrete. In addition, recycled concrete lem wait [14] With Burdette wait [15] Freeze-thaw resistance of road recycled concrete Conducted preliminary research. The results show that from a cold tolerance perspective, roads Raw aggregate concrete has better frost resistance and durability, while road recycled concrete has stronger The degree loss rate and mass loss rate are relatively small, especially when combined with fly ash and metakaolin. The freeze-thaw cycle after mixing with soil and other mineral admixtures is very small, indicating that the road Raw concrete has high durability and strong frost resistance.

3. RESEARCH PROGRESS ON ROAD USE OF RECYCLED AGGREGATES

With the continuous development of transportation infrastructure, natural aggregates are gradually facing dryness. exhaust. At the same time, the urgent demand for aggregates in the field of road engineering has prompted a large number of researchers to Researchers have conducted various studies on the application of recycled aggregates in roadbed. study [16]. Zhang Chao et al. [17] conducted physical and mechanical properties tests of recycled aggregates and water mud stabilized gravel 7, 28 d Unconfined saturated compressive strength test. Test results table It is obvious that recycled aggregate has good road performance, and its inorganic composite stabilized gravel is full of Meet the requirements of current high-grade highway base specifications. Yang Qingguo et al. [18] On regenerated bone The physical and mechanical properties and road performance of the material were studied in detail, and the results showed that : The content of coarse aggregate in recycled aggregate is relatively high, and the recycled aggregate can be designed through combination Form various good gradations. In addition, apparent density, firmness, crushing value and abrasion value recovery can always meet the technical requirements of coarse aggregates.

4. KNOT ARGUMENT

- 1) Compared with natural aggregate concrete, road recycled aggregate concrete has various The poor performance is mainly attributed to the poor performance of road recycled aggregate, which indirectly affects Concrete properties.
- 2) Reasonable and effective deployment of the dosage of road recycled aggregate can greatly improve the mechanical properties of road recycled aggregate and even be better than natural aggregate concrete.
- 3) Road recycled concrete itself has relatively good durability properties. Adding mineral admixtures such as fly ash and metakaolin can effectively improve its durability.

5. ESTABLISH DISCUSS

- 1) Considering the influence of geographical environment and climate difference between north and south, the moisture content of recycled aggregates is different, and the test data of the workability of recycled concrete will also be different. Therefore, speeding up the revision of the test specifications for recycled aggregates can speed up the development of recycled concrete. promotion process.
- 2) Due to the existence of the "reservoir" effect, recycled aggregates have a certain content. The amount of water will affect the mixing water consumption and optimal moisture content of the recycled pavement mixture. Therefore, the moisture content of recycled aggregates should be standardized.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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