

Retraction

Retracted: Seismic Performance Analysis of Steel Truss Coal Conveying Trestle Based on Multisensor Data Fusion

Discrete Dynamics in Nature and Society

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] B.-y. Yao, "Seismic Performance Analysis of Steel Truss Coal Conveying Trestle Based on Multisensor Data Fusion," *Discrete Dynamics in Nature and Society*, vol. 2022, Article ID 7102779, 10 pages, 2022.

Research Article

Seismic Performance Analysis of Steel Truss Coal Conveying Trestle Based on Multisensor Data Fusion

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Coal ranks first in the energy demand of our country, and it also plays an unshakable role in promoting national defense and economic development. Coal conveying trestle is the link and lifeline in the process of coal production. Once it is damaged by an earthquake, it will cause great losses in the production of coal enterprises. Therefore, it is of great significance to analyze the seismic performance of long-span coal conveying trestle and apply it to engineering design. To solve this problem, an analysis method based on the combination of field measurement and finite element simulation is proposed. Firstly, multisensor data fusion is introduced, and the finite element model for the dynamic characteristic analysis of long-span coal conveying trestle is constructed. Then, based on multisensor data fusion, the dynamic characteristics of long-span coal conveying trestle are measured. Finally, the model is modified based on the measured results, and the seismic performance of long-span coal conveying trestle under strong earthquake is analyzed. The results show that the model can accurately characterize the seismic performance of long-span coal handling trestle, which provides an effective numerical simulation method for the engineering design of coal handling trestle.

1. Introduction

Coal mining is a development field of great strategic significance. With the progress of industry and the increasing demand for coal energy, the safety and stability of coal mining and transportation engineering have attracted more and more attention [1, 2]. Coal conveying trestle is not only the connecting channel of coal production link but also the link and lifeline of production and transportation process. The coal conveying trestle is strip-shaped, and its structural characteristics are large structural span, high support, heavy bearing equipment, and being greatly affected by working load (motor vibration disturbance, dynamic action of coal conveying belt, etc.). With the continuous development of industry, there are more and more coal conveying trestles used in energy projects such as coal mines, coal preparation plants, and thermal power plants. Ensuring the safety and smoothness of coal conveying trestle is an important link in the whole coal production process. Especially for the long-span coal conveying trestle, its mass and stiffness are

unevenly distributed along the vertical direction and there are many weak parts. These characteristics lead to its abnormal sensitivity to vibration load. It should be noted that more than 80% of the mining areas are in strong earthquake areas. Once the coal conveying trestle is damaged by the earthquake, it will cause great losses to the production of coal enterprises. For example, in the “5.12” Wenchuan earthquake, many small- and medium-sized coal mines were completely shut down. According to the survey, some coal conveying trestles that have been designed for earthquake resistance have also been seriously damaged under the earthquake with fortification intensity, which reflects the shortcomings and defects of the seismic design of coal conveying trestles. Therefore, it is of great significance to analyze the seismic characteristics and safety evaluation of long-span coal conveying trestle and apply it to engineering design.

In nearly half a century, the seismic investigation and analysis of long-span trestle have been widely carried out, which provides us with not only valuable experience and

lessons but also the scientific basis for establishing correct seismic design methods and taking effective seismic measures [3, 4]. In the investigation and research of a large number of earthquake disasters, the reasons for the damage of trestle structure mainly include the following: The first reason is the improper connection between trestle spans or between trestle spans and adjacent buildings. When the overall torsion and translational vibration occur in the process of earthquake movement, tensile cracking, falling, and collision damage will occur between spans or ends. The second reason is node failure. The joint connection belongs to the weakness of the structural system. Once the structure is handled improperly or the bearing capacity is insufficient in the design, the whole trestle system will not work normally or even break and collapse. The third reason is damage caused by insufficient seismic capacity of trestle support. Correspondingly, some useful research works on the seismic characteristics of long-span spatial structures have been implemented by scholars. The seismic performance and dynamic response of long-span coal conveying trestle have been studied in [5, 6], providing a reference for the design of trestle engineering. In [7–9], the improvement methods of differential settlement mechanical characteristics and mechanical performance of coal conveying trestle have been studied, providing suggestions for structural reliability appraisal of coal conveying trestle. In [10–12], the seismic performance and damage control of bridges are studied, and their respective solutions are put forward. In [13], the dynamic characteristics of long-span steel structures under strong earthquake are studied, and the anticollapse optimization method of long-span bridges under strong earthquake is proposed. In [14], the seismic performance of long-span cable-stayed bridges is studied, and the main seismic codes are compared to provide a reference for the seismic design of long-span bridges. However, it should be pointed out that most of the above documents are limited to the seismic analysis of bridge structures, but the coal handling trestle structure has its unique characteristics compared with general bridge structures. Therefore, whether the research results of the bridge can be applied to the coal handling trestle is doubtful.

On the whole, at present, the research on long-span coal conveying trestle mostly focuses on the structural optimization of trestle and the development of new system or the dynamic stability of coal conveying trestle under mechanical vibration and wind-induced vibration. The seismic research methods of long-span coal conveying trestle are mostly based on numerical simulation, which is lack of inspection and correction of field measured data. In addition, the established numerical model is relatively simple, which has a certain deviation from the engineering practice. It should be noted that neither numerical simulation nor being relatively close to the actual wind tunnel test can fully simulate the load under the actual situation. Therefore, obtaining field measured data is an indispensable and important link in the research process. In practical application, the environmental factors of coal conveying trestle are very complex. Due to the large number of coal mines in China, there are countless coal conveying trestles of different specifications, which means

that there is a large amount of data to be analyzed. The response of coal conveying trestle to vibration load can be extracted by vibration sensor. Sensors are an important part of wireless sensor networks. Sensor nodes can be connected with each other through wireless communication, and the collected information can be transmitted quickly [15–17]. Sensors have the characteristics of sensitivity, miniaturization, and intelligence. A large number of sensor nodes can form wireless sensor networks, and data information collection, transmission, and storage can be carried out in complex environments [18]. With the help of data fusion technology, a large number of sensors can match and correlate multisource information, and systematic, multi-level, and multifaceted processing can be realized. By using appropriate judgment methods, the state of the detection target can be obtained more accurately and reliably. At present, multisensor data fusion technology is widely used. For example, based on multisensor data fusion method, the local state data is estimated in [19], and the global optimal estimation of system state is obtained. In [20], the multisensor data fusion method of Gaussian system is used to fuse the complex data obtained by multiple sensors, the consistency description of the measured object is obtained, and the efficiency of data acquisition and the accuracy of information transmission are also improved. With the development of modern technology, the data fusion technology based on multiple sensors provides an effective solution for the load extraction of coal handling trestle.

At present, sensor based wireless communication technology is widely used in various environmental detection systems. This paper is also proposed under this background. In order to make up for the deficiency of the research status, a method based on the combination of field data extraction and finite element simulation is proposed in this paper. It is used for the seismic design and analysis of coal conveying trestle. The structure of this paper is as follows: In Section 1, the relevant research status is introduced. In Section 2, the principle and classification method based on multisensor data fusion are described. In Section 3, the finite element modeling of long-span coal handling trestle is introduced. In Section 4, the dynamic characteristics of long-span coal conveying trestle are measured. In Section 5, the seismic performance of long-span coal conveying trestle under strong earthquake is analyzed. In Section 6, the work of this paper is summarized and prospected.

2. Data Fusion Based on Multiple Sensors

2.1. Principle of Data Fusion. Data fusion is an information processing method aimed at the specific problem of using multiple sensors in the system. Therefore, data fusion is also called multisensor data fusion. Multisensor system is the hardware basis of data fusion. Multisource information is the processing object of data fusion. Coordination, optimization, and integration are the core of historical data fusion. According to the process of human recognition information, data fusion can be generally defined as follows: through the collection and transmission of effective

information from a variety of information sources, the final cognitive results are generated to assist people in judgment and verification. For different times and places, the acquisition and transmission process of multisensor information is multisensor data fusion, which aims to optimize and simplify the information.

From the perspective of multisensor information processing and synthesis, the internal relations and laws of various information are extracted by multisensor information fusion technology. The useless and wrong information is removed, the correct and useful components are retained, and the optimization of the final information is realized. Using the advantages of multisensor cooperation, the characteristics of the measured object can be accurately reflected, the uncertainty of information can be eliminated, and the reliability of the whole system can be improved. This method can eliminate the limitations of a single sensor or a small number of sensors. Therefore, the fused multisensor data information has the characteristics of redundancy, complementarity, real time, and low cost. The data fusion process mainly includes multisensor signal acquisition, data preprocessing, fusion center (feature extraction and fusion calculation), and result output. The flow chart is shown in Figure 1.

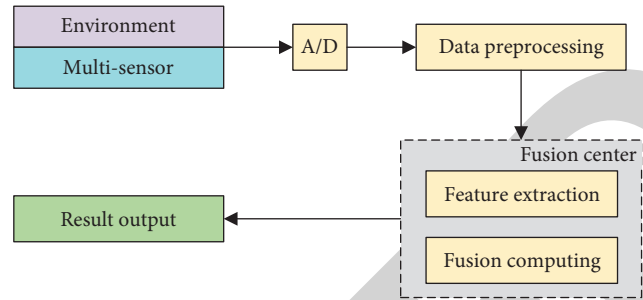


FIGURE 1: Flow chart of data fusion process.

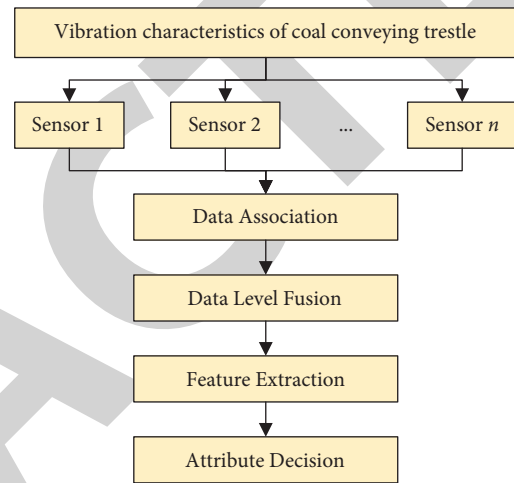


FIGURE 2: Data level fusion.

2.2. Classification of Data Fusion. According to the different types of data processing levels, data fusion can be divided into data level fusion, feature level fusion, and decision level fusion. Among them, data level fusion can directly fuse the information collected by the same kind of sensors, which greatly retains the original characteristics of the data, while other levels of fusion methods cannot retain the original information. It cannot be denied that data level fusion has many limitations, such as more collected data, large amount of data, long processing time, and being easy to delay. Moreover, with the increase of sensor nodes, the amount of information to be processed will also increase, which seriously affects the work efficiency of sensor nodes. However, for the detection of vibration characteristics of coal conveying trestle, the defects of data level fusion can be ignored, and its advantages are particularly obvious, because, compared with other data fusion methods, data level fusion is more suitable for similar sensors. By matching the appropriate data level fusion algorithm, the system can have strong error correction ability and then eliminate the invalid information. The method of data level fusion is shown in Figure 2.

It can be seen that the accuracy of data can be guaranteed by detecting the vibration characteristics of coal conveying trestle based on multisensor data fusion. Compared with the uncertainty of the information collected by a single sensor, the data information collected by multiple sensors can make up for each other, reduce the uncertainty of the collected information, and make the obtained data more accurate. In addition, through data fusion technology, the vibration characteristics of coal conveying trestle can be reasonably evaluated.

3. Finite Element Modeling for Long-Span Coal Conveying Trestle

3.1. Basic Theory. The effect of vibration load caused by earthquake on coal conveying trestle and the response of coal conveying trestle are dynamic. In order to analyze the influence of these factors on coal conveying trestle, it is necessary to analyze the dynamic characteristics of coal conveying trestle first. Modal analysis is a typical method, which can effectively avoid the damage caused by resonance of coal handling trestle. At the same time, modal analysis can solve the structural vibration mode and its natural frequency, and it is also an important symbol to measure whether the stiffness and quality of coal conveying trestle match or not. Before the analysis, it is necessary to explain the basic theory of modal analysis.

Under the action of earthquake, the dynamic equation of structural members is as follows:

$$M\ddot{u}_a(t) + C\dot{u}_a(t) + Ku_a(t) = F(t) = \sum_{j=1}^J f_j g_j(t), \quad (1)$$

where $g_j(t)$ is the j th time-dependent function and f_j is the time-independent space vector. In modal analysis, the solution of equation (1) is set as

$$u(t) = \phi Y(t), \quad (2)$$

where ϕ is an $N \times N$ matrix and $Y(t)$ is the vector of time function. According to formulas (1) and (2),

$$\begin{cases} \dot{u}(t) = \phi \dot{Y}(t), \\ \ddot{u}(t) = \phi \ddot{Y}(t). \end{cases} \quad (3)$$

The conditions to be satisfied by equation (3) are

$$\begin{cases} \phi^T K \phi = \Omega^2, \\ \phi^T M \phi = I. \end{cases} \quad (4)$$

Equation (4) is the orthogonal condition of the spatial function with respect to the stiffness and mass of the coal handling trestle, Ω^2 is the diagonal matrix of the coal handling trestle, and I is the identity matrix. Substituting equation (4) into equation (1) yields

$$I \ddot{Y}(t) d \dot{Y}(t) + \Omega^2 Y(t) = \sum_{j=1}^J P_j g_j(t), \quad (5)$$

where $P_j = \phi^T f$ and d is the damping matrix of the coal handling trestle. The diagonal term is $d_m = 2\xi_n \omega_n$. ξ_n is the ratio of the damping of the coal handling trestle to the critical damping in the n th vibration mode. From the above equation,

$$\ddot{y}(t) + 2\xi_n \omega_n \dot{y}(t) + \omega_n^2 y(t) = \sum_{j=1}^J P_{nj} g_j(t). \quad (6)$$

Equation (6) is a typical form of modal equation. Under the action of seismic load, the above equation can be rewritten as

$$\ddot{y}(t) + 2\xi_n \omega_n \dot{y}(t) + \omega_n^2 y(t) = P_{nx} \ddot{u}(t)_{gx} + P_{ny} \ddot{u}(t)_{gy} + P_{nz} \ddot{u}(t)_{gz}, \quad (7)$$

where the seismic excitation generated by the modal coefficient is defined by $P_{ni} = -\phi_v^T M_i$.

ABAQUS is used for the subsequent dynamic characteristic analysis of coal conveying trestle. The solution methods of equation (6) by this software include Lanczos method, automatic multistage substructure (AMS) method, and subspace iteration method (Subspace). In general, the Lanczos method is faster. Subspace is more suitable for solving a small number of modes (less than 20). The solution speed of AMS is faster than that of Lanczos method, especially for systems with multiple degrees of freedom, but AMS method has certain localization. Considering comprehensively, Lanczos method is selected to solve the first 30 natural frequencies and vibration modes of coal conveying trestle.

3.2. Finite Element Modeling. The steel truss coal conveying trestle of a coal mine company is selected as the research object, and its substructure is frame reinforced concrete. The reinforced concrete truss leg and the top of the coal handling trestle frame are connected by anchor bolts and embedded by anchor plates, which can be used

as a hinged support. The column bottom of the frame column is rigidly connected with the independent base. The upper end of the truss of the coal conveying trestle is connected with the transfer station through bolts and limit devices, which can be regarded as transverse hinge and longitudinal sliding connection. In order to ensure that the built model can reflect the real structure to the greatest extent, based on the actual design drawings and relevant standards and specifications, the interconnection between structural members in the modeling process is handled as follows:

- (1) The connection between the reinforced concrete truss and the top is hinged.
- (2) The frame column and the base are completely rigidly connected.
- (3) The lowest part of the truss is supported on the rigid column. Because the longitudinal stiffness of the long-span coal handling trestle is smaller than that of the rigid column, the lowest point boundary can be approximated as a hinged support.
- (4) The highest point of the truss is connected with the transfer station. The longitudinal displacement of the bridge truss caused by temperature change and the requirements of seismic joint on the structure need to be considered. Therefore, the highest fulcrum is set as the sliding hinge support, which is hinged horizontally and sliding longitudinally along the long-span coal conveying trestle.
- (5) As the body of the coal conveying trestle is a prestressed reinforced concrete truss, the two ends of the beam, web member, horizontal support rod, and vertical support rod are rigidly connected. In addition, all nodes in the same span of the coal conveying trestle are regarded as continuous rigid connections.

The relevant material properties in the three-dimensional model of coal handling trestle are shown in Table 1. Besides, the material is considered to be isotropic in all directions. The constitutive model of reinforcement can be regarded as an ideal elastic-plastic model, and the yield strength is 400 MPa. At the same time, in order to improve the computational efficiency, some idealized assumptions are defined. For example, the displacement between the structural members of the model is synchronous, and all connections are regarded as complete rigid connections or hinges. Some components in the structure (e.g., pipeline equipment, belt, etc.) are ignored, because these secondary structural members have little influence on the overall stiffness.

Finally, the C3D10M solid element in ABAQUS is used for discrete operation, and the mesh of the model is divided into triangular elements. The total number of model elements after division is 64852, and the grid density is 0.5 m. The 3D simulation model of the coal conveying trestle structure and the details are shown in Figures 3 and 4.

TABLE 1: Material properties.

Structure	Young's modulus (N/m ²)	Density (kg/m ³)	Poisson's ratio
Frame concrete	3.25×10^{10}	2.4×10^3	0.2
Steel truss concrete	3.35×10^{10}	2.5×10^3	0.2
Steel bar	2×10^{10}	7.8×10^3	0.2

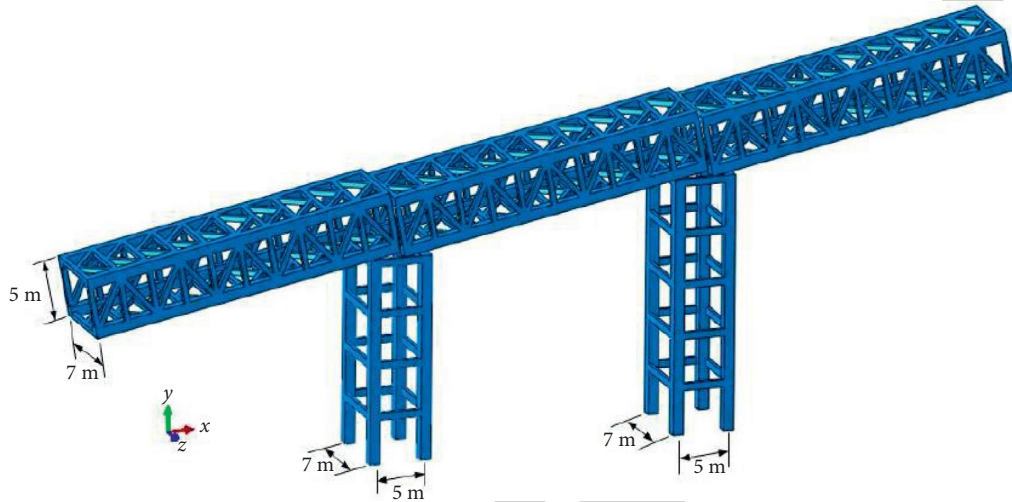


FIGURE 3: The 3D model of coal conveying trestle.

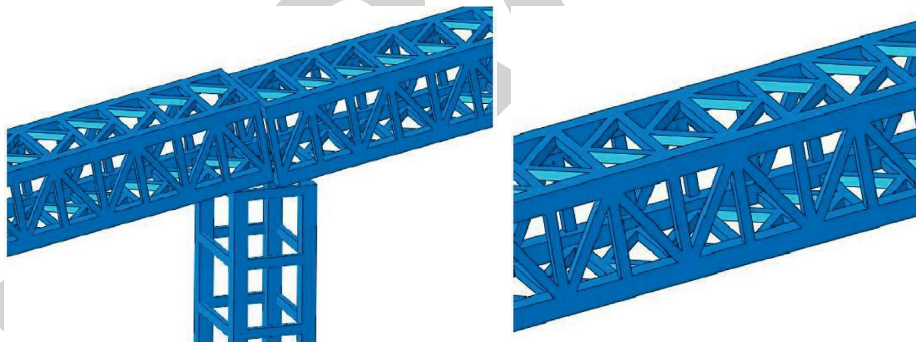


FIGURE 4: Partial details of the model.

4. Field Measurement of Dynamic Characteristics

Natural vibration frequency is not only an important dynamic characteristic of coal conveying trestle but also an important parameter in the dynamic design of coal conveying trestle. It is only related to the inherent properties of coal conveying trestle but has nothing to do with the dynamic load borne by coal conveying trestle. Therefore, it is persuasive to modify the structural model with the measured natural vibration frequency of coal conveying trestle. It is necessary to obtain the natural frequency of the coal conveying trestle through field measurement and modify the finite element model based on the measurement results, so as to study the seismic performance of the long-span coal conveying trestle.

4.1. Measuring Instrument. In the test, the 991B ultra-low-frequency vibration pickup and corresponding supporting amplifier are adopted. The equipment has the characteristics of large measurement dynamic range, wide frequency band, small volume, and light weight. The main technical indexes of the vibration pickup include the following: input noise $\leq 1 \mu\text{V}$, the output load is 1 K, the input impedance is 300 K, and the magnification is 1~5000. At the same time, the DH3820 high-speed quasi-static strain data acquisition instrument and the corresponding DASP data acquisition software are used for signal processing, and finally the graphics and data can be obtained. The architecture of data acquisition and processing system is shown in Figure 5, and the physical diagram of the data acquisition system is shown in Figure 6.

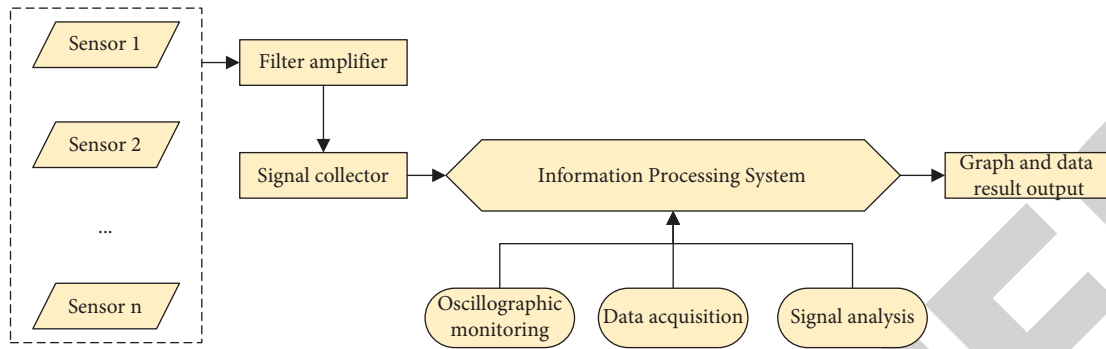


FIGURE 5: Architecture of data acquisition and processing system.



FIGURE 6: Physical diagram of data acquisition system.

4.2. Field Measurement Scheme Based on Multiple Sensors. A total of 18 measuring points are arranged at the positions with severe vibration and structural characteristics of the coal conveying trestle. Then, the measuring points with good vibration effect will be selected, and the displacement spectrum can be obtained. The arrangement of measuring points of vibration pickup is shown in Figure 7.

The vibration pickups are installed at each measuring point, and the transverse horizontal vibration displacement of the coal conveying trestle is measured in real time. A cushion block is placed at each measuring point, which is used as the base of the vibration pickup. Finally, the vibration pickup is fixed on the cushion block with glue. A measuring point measured on-site is shown in Figure 8(a). After the vibration signal is measured, it will be processed by the amplifier, as shown in Figure 8(b).

In the process of no-load braking, there is a large variation range in the vibration frequency of the coal conveying trestle. Meanwhile, the natural vibration frequency of the coal conveying trestle is included in this range, so there must be a resonance stage in this process. Therefore, in the no-load state of the coal conveying trestle, when the running speed of the coal conveying belt reaches 4 m/s, the braking deceleration shutdown is implemented. At this time, the vibration displacement data of each measuring point are collected on-site, and the displacement time history curve of each measuring point is drawn, so that the displacement spectrum of each measuring point and the natural vibration frequency of

coal conveying trestle can be obtained. Based on this, the measured natural frequency can be used to modify the finite element model.

5. Seismic Performance Analysis

Based on the field measurement of dynamic characteristics in Section 4, the finite element model is modified by using the measured data, and the modal and seismic analysis are carried out through the modified model to study the dynamic characteristics of long-span coal handling trestle under earthquake.

5.1. Modal Analysis. Firstly, the modal solution of the constructed model is carried out to obtain the vibration mode and natural frequency of the long-span coal conveying trestle. The seismic weakness of the coal conveying trestle can be obtained intuitively and qualitatively from the vibration mode diagram, so as to verify whether the ultimate deformation capacity of the weakness can meet the needs of seismic action. The vibration mode diagram of the coal conveying trestle is shown in Figure 9. It can be seen that the deformation of the frame column is large, while the deformation of the trestle body is relatively small, which will lead to greater stress at the connection between the trestle and the frame column. It can be seen that the connection between the support body and the frame column, as well as the frame column are the weak parts of the large-span coal conveying support.

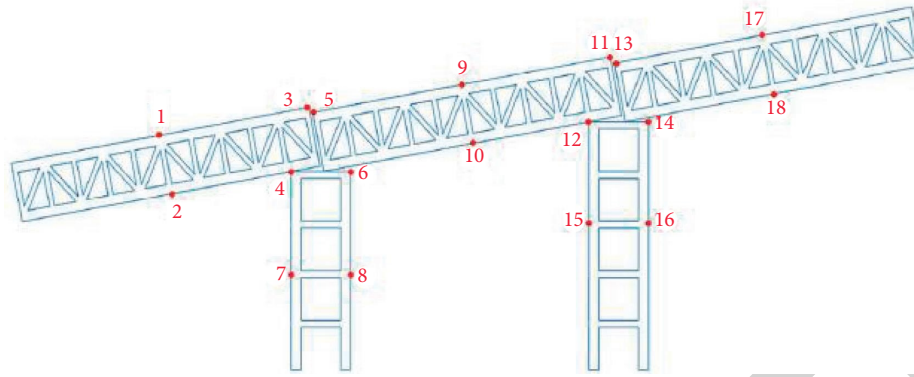


FIGURE 7: Arrangement of measuring points with vibration pickup.



(a)



(b)

FIGURE 8: Measuring point and the amplifier of vibration pickup. (a) Measuring point 7. (b) Amplifier of vibration pickup.

5.2. *Model Correction Based on Measured Data.* The displacement data of each measuring point is collected by the device in Section 4, and the measuring point with good vibration effect is selected to draw the displacement spectrum, so as to obtain the natural vibration frequency of the coal conveying trestle. Taking the observed point 8 as an example, its vibration displacement response is shown in Figure 10.

The above test is calculated again by the modified model; the gotten natural vibration frequency of the coal conveying trestle is 1.416 Hz, as shown in Figure 11. The results show that the deviation ratio between numerical simulation and field measurement results is 1.85%, which is acceptable from the perspective of engineering application. Through comparison, it can be seen that the numerical simulation results of the natural vibration frequency of the coal conveying trestle structure are lower than the field measured results. The main reasons for the error include the following: some secondary structures such as the maintenance structure on the side of the coal conveying trestle are ignored in the process of structural model modeling, which makes the overall stiffness of the trestle too small. In addition, there are errors in the field measurement itself. The comparison between field measurement and numerical simulation results shows that the structural modeling method of coal conveying trestle in this paper is feasible.

5.3. *Analysis of Dynamic Characteristics under Earthquake Action.* The elastic-plastic deformation of coal conveying trestle under strong earthquake is the result of comprehensive deformation of frame column, trestle body truss, and other components. In the following, the maximum interstory displacement angle of frame columns and the maximum deflection of trestle truss under strong earthquake are taken as the basis for investigating the seismic performance of the coal handling trestle structure. Under strong earthquake, the horizontal displacement time curve of observation point 1 on the frame column is shown in Figure 12, and the horizontal displacement time curve of observation point 10 on the trestle truss is shown in Figure 13. It can be found that the shape, amplitude, and frequency of horizontal displacement time curve of frame column and trestle truss are different. It shows that the seismic performance design of frame column and trestle truss is more reasonable, which is also consistent with the actual situation.

The deflection curve of trestle truss under earthquake is given from Figure 14. The results show that the vibration frequency at both ends of the trestle is much higher than that near the frame column in the middle. According to the comparison between Figures 12 and 14, the vibration frequency of frame column is much lower than that of trestle body truss. The main reason is that the frame column is the main structural member against lateral force, and its elastic-

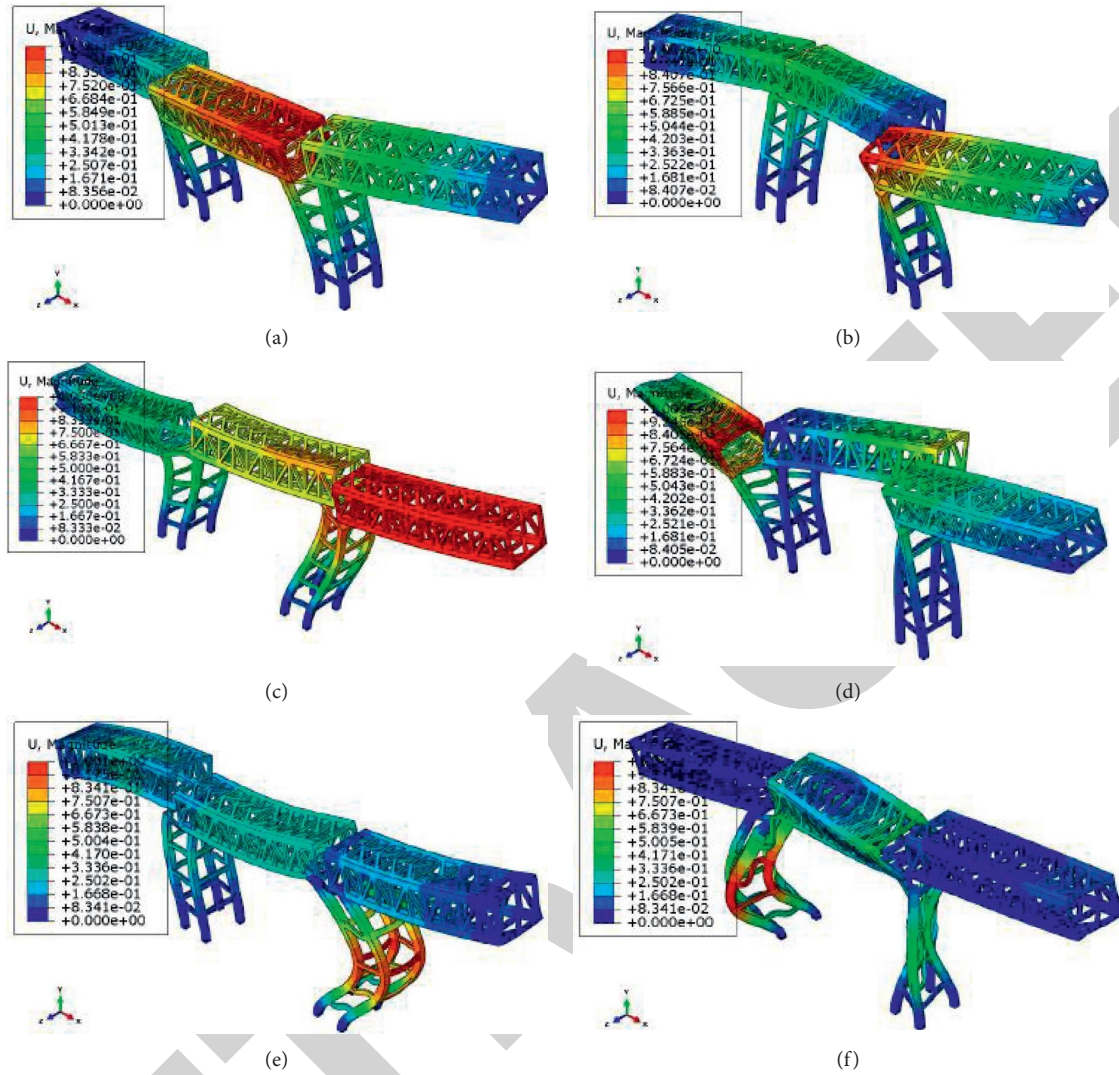


FIGURE 9: Vibration mode diagram of coal conveying trestle. (a) The first mode. (b) The second mode. (c) The third mode. (d) The fourth mode. (e) The fifth mode. (f) The sixth mode.

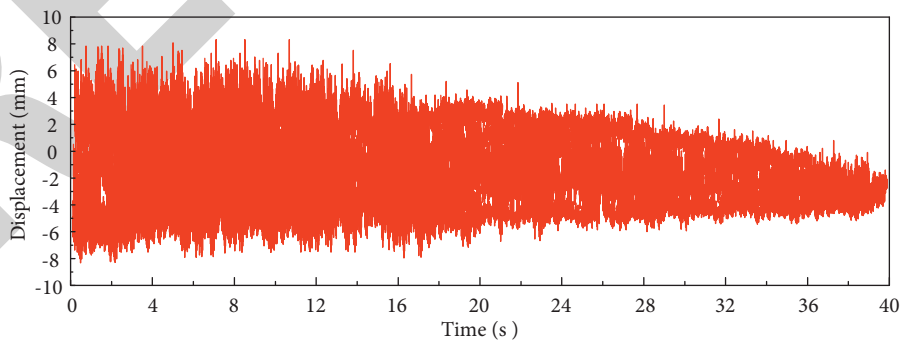


FIGURE 10: Vibration displacement response diagram of observation point 8.

plastic horizontal displacement is relatively large, which dissipates a large amount of seismic energy of the trestle truss, resulting in a lower vibration frequency of the middle truss near the frame column, but higher than that of the frame column. This also shows that the frame column is the main

seismic structure. To sum up, the trestle structure studied has good seismic performance, and the structural deformation is far lower than the provisions of relevant codes. The main truss of trestle is of high seismic bearing capacity, and the deformation under earthquake is acceptable.

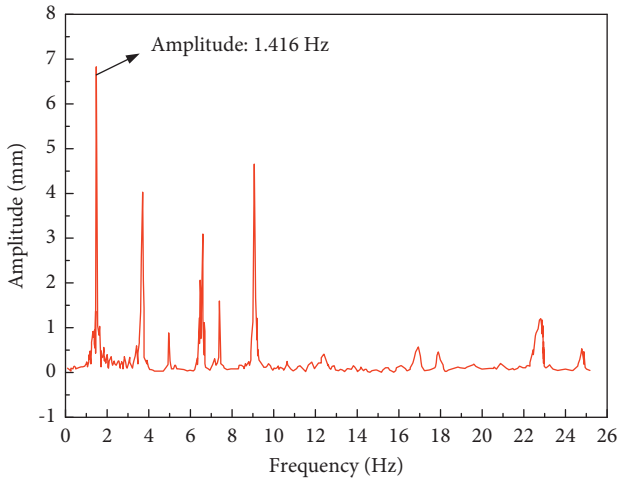


FIGURE 11: Vibration displacement spectrum of observation point 8.

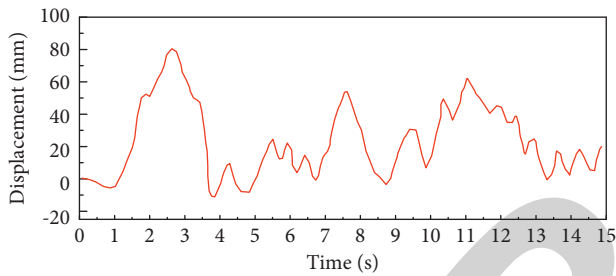


FIGURE 12: Horizontal displacement time curve of frame column at observation point 1.

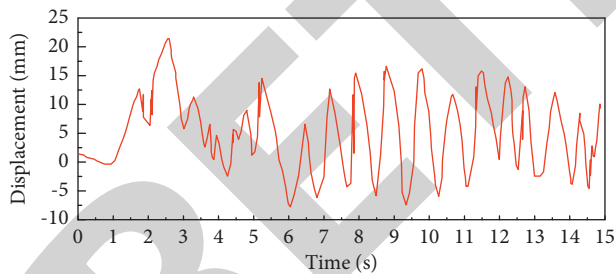


FIGURE 13: Horizontal displacement time curve of trestle truss at observation point 10.

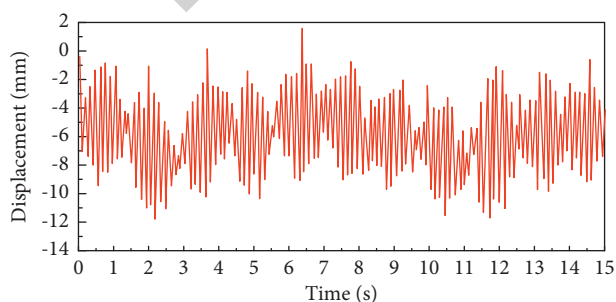


FIGURE 14: Deflection curve of trestle truss at observation point 1.

6. Conclusion

Aiming at the seismic performance analysis of coal conveying trestle, an analysis method based on the combination of field survey and finite element simulation is proposed. A long-span coal conveying trestle is selected as the research object of this problem. Through the field measurement based on multisensor data fusion, the dynamic characteristics of coal conveying trestle are obtained, and these data are used to modify the finite element model. The seismic performance of long-span coal conveying trestle under strong earthquake is studied. The research results prove the rationality and efficiency of the numerical simulation method and show that the numerical model established in this paper can provide a feasible analysis method for the stress and seismic performance of coal conveying trestle under earthquake and provide a reference for the seismic design of coal conveying trestle structure. Considering the complexity of the environment where the coal conveying trestle is located, the multidimensional seismic input problem can be considered in the future research, which can be expected to obtain a more comprehensive seismic performance of long-span coal conveying trestle.

Data Availability

The dataset can be accessed upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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