Quality Detection Method of Phase Change Energy Storage and Thermal Insulation Building Materials Based on Neural Network

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Abstract. In order to improve the quality detection ability of thermal insulation building material, a phase change energy storage thermal insulation building material quality detection method based on neural network is put forward. The double broken line model is used to detect and evaluate the quality of phase change energy storage thermal insulation building material. Combined with the material stress characteristics and dissipation characteristics, the seismic evaluation of phase change energy storage thermal insulation building material is carried out, and the self-recovery energy dissipation support model of phase change energy storage thermal insulation building material is established. Under the constraint of quality parameter constraint model and neural network control model, the quality of phase change energy storage thermal insulation building materials is evaluated quantitatively by using network adaptive control method, and the stress distribution characteristic parameters of phase change energy storage thermal insulation building materials are calculated respectively to realize the quality detection of phase change energy storage thermal insulation building materials. The simulation results show that the accuracy of phase change energy storage and thermal insulation building material quality detection is high, the accuracy of parameter evaluation is good, and the quality detection ability is very good.

Keywords: Neural network · Phase change energy storage · Thermal insulation building materials · Quality inspection

1 Introduction

With the rapid development of China's economy, the pace of urbanization in China is moving forward. Various industries in the city have sprung up after a spring rain, and the urban construction industry is developing particularly rapidly. The development of urban construction infrastructure related industries has become more attractive, and the quality of the overall construction project is the most important [1]. The decisive factors affecting the quality of the whole building project are thermal insulation building materials and building infrastructure, which are the foundation to ensure the quality of the whole building construction project. Therefore, the quality of thermal insulation building materials should be strictly tested in the construction process to prevent the application of unqualified thermal insulation building materials to

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infrastructure construction, which requires strict inspection and analysis of thermal insulation building materials by scientific and technical means [2]. In the construction process of housing construction project, how to optimize the selection is the key, and the housing construction project is based on the related material quality inspection, which will have a direct impact on the whole process. Therefore, in order to ensure the smooth and orderly construction process and all the processes meet the requirements, we must do a good job of material quality inspection and analysis, and actively optimize the detection and improve the feasibility.

With the wide application of phase change energy storage thermal insulation building materials in buildings, the strength and stability of phase change energy storage thermal insulation building materials have attracted people's attention. In reference [3], a nondestructive testing method of steel structure based on BIM and surface image analysis is proposed. The wavelet decomposition method is used to denoise the detection image of steel structure of building. The clarity of the detection image is enhanced through expansion and corrosion treatment. Infrared image technology is used to extract the defect edge in turn through rotation tracking method according to the change rate of the detection image recovery at the defect edge. Based on B Im's steel structure detection model for green construction in seismic area, fully control the material, nondestructive testing and management process of green construction steel structure in seismic area, control the whole life cycle of building steel structure, and complete the nondestructive testing of building steel structure. Literature [4] on the basis of expounding the connotation of the quality inspection of the main structure of the construction project, analyzes its specific inspection process and methods, and points out the specific application of the quality inspection technology of the main structure. But the accuracy of building materials quality inspection of the above two methods is low.

In view of the above problems, this paper proposes a method of phase change energy storage and thermal insulation building material quality detection based on neural network. Firstly, the finite element simulation analysis model of phase change energy storage and thermal insulation building materials is established, and then the neural network adaptive control method is used to quantitatively evaluate the quality of phase change energy storage thermal insulation building materials to realize the quality detection of phase change energy storage thermal insulation building materials. Finally, the simulation experiment is carried out, and the effective conclusion is obtained.

2 The Significance and Method of Quality Inspection of Heat-Insulating Building Material

2.1 Significance of Quality Inspection of Thermal Insulation Building Materials

In the process of testing the materials used in the building, it is particularly important to ensure the accuracy of the test results. It is necessary not only to test the quality of the construction materials used in the construction of the building project, but also to understand its performance, so as to ensure the completion of high quality in the construction process of the building project. In order to ensure that the methods and methods of testing are scientific and effective, it is necessary to carry out the inspection of the related materials used in houses and buildings in combination with the specifications in this area and follow the standards in order to ensure that the methods and methods of testing are scientific and effective. Thus it can be seen that no matter what type of housing construction project, in the whole process of construction, it is necessary to carefully detect the materials involved in the relevant housing construction, which is not only conducive to fully ensuring the construction quality of the housing construction project, but also effectively ensures that the safety of the construction personnel is not threatened [5–7].

2.2 Purpose and Method of Quality Inspection of Thermal Insulation Building Materials

(1) Material quality inspection project.

Thermal insulation building materials have great influence on the quality of building engineering, so we must pay great attention to it. In the process of quality inspection, appropriate schemes and measures should be taken. For material quality inspection and test, the corresponding testing methods and means should be adopted according to the specific texture of the material. From the current actual situation, the thermal insulation construction materials in the housing construction industry can be described as a variety of materials, such as stone, cement and so on, these belong to structural materials, such as paint, tiles and so on, these belong to decorative materials [8]. In the specific construction process, will involve all aspects of construction materials, functions and types are relatively complete. These materials are basically provided by suppliers, the quality and compliance of these materials can not be guaranteed, so all incoming materials must be checked, and the quality inspection objectives should be used as the basis of testing in accordance with the unified national regulations, so as to ensure that all material tests can meet the eligibility standards. For example, taking cement as an example, it is necessary to test its stability and strength, and to carry out omni-directional testing for different types and functions of thermal insulation building materials, so as to promote the detection and test of thermal insulation building materials to reach the standard [9].

(2) Sampling test.

In the process of sampling, more typical samples should be taken. Usually, the specified quantity of samples should be taken arbitrarily at different positions of a batch of materials, not only to ensure the correct sampling quantity, but also to extract according to the requirements. The sampling quantity is closely related to the accuracy of the test results. Too little sampling quantity, or if the sampling method and position are wrong, will increase the test error, and even obtain the opposite results. However, in practice, sampling atypical cases often occur.

(3) Control the humidity and temperature of the detection environment.

Because the temperature and humidity of the environment will seriously affect some thermal insulation building materials, it is necessary to strictly follow the relevant environmental standards to adjust and control the humidity and temperature when testing the quality of thermal insulation building materials. For example, in the process of concrete mixing test in summer, the temperature of water should not be higher than 20 °C, and the cold water of deep well should be the best.

(4) Scientific processing of data.
In the course of the test, due to the influence and distress of many factors, the test results are not satisfactory. For the same group of specimens, their test results are likely to appear greater discreteness. In order to minimize this error, it is necessary to give appropriate data processing to the test results. It should also be noted that there is a big gap between the test results and the expected results, and the results are very different. For the test results, the experimenters need to be carefully analyzed, and the causes of its formation are analyzed, and the results of the relatively wide disparity need to be tested repeatedly until the reasons are found out, so as to ensure the availability of the test results [10].

3 Finite Element Simulation of Phase Change Energy Storage and Thermal Insulation Building Materials

3.1 Finite Element Simulation Analysis of Phase Change Energy Storage and Thermal Insulation Building Materials

In order to realize the quality detection of phase change energy storage and thermal insulation building materials, the support finite element simulation analysis model of phase change energy storage thermal insulation building materials is established. The double broken line model is used to detect the quality of phase change energy storage thermal insulation building materials, and the finite element simulation and support double structure simulation methods are used to detect the support finite element characteristics of phase change energy storage thermal insulation building materials [11]. The finite element analysis model of phase change energy storage thermal insulation building material is established, and the neural network model is used to detect the quality of phase change energy storage thermal insulation building material. The neural network model is shown in Fig. 1.

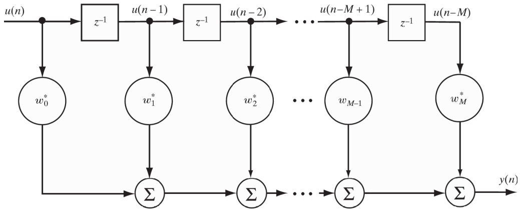

Fig. 1. Neural network model

The joint distribution model of main physical parameters for automatic quality detection of phase change energy storage thermal insulation building materials is established. The steady state characteristic equation of phase change energy storage thermal insulation building materials under sinusoidal excitation is obtained as follows:

$$\begin{aligned} T = & \tfrac{1}{2} M_{RL} \dot{X}_{RL}^2 + \tfrac{1}{2} M_{RR} \dot{X}_{RR}^2 + \tfrac{1}{2} J_{RL} \dot{\theta}_{RL}^2 + \tfrac{1}{2} J_{RR} \dot{\theta}_{RR}^2 \\ & + \tfrac{1}{2} M_p \left[\left(\dot{\theta}_p L \cos \theta_p + \dot{X}_{RM} \right)^2 + \left(-\theta_p L \cos \dot{\theta}_p \right)^2 \right] + \tfrac{1}{2} J_{P\theta} \dot{\theta}_P^2 \\ & + \tfrac{1}{2} J_{P\delta} \dot{\delta}^2 \end{aligned} \tag{1}$$

$$V = M_P g L \cos_{\theta_P} \tag{2}$$

When it is restored to the origin, NSYS finite element simulation is used to match the model features of phase change energy storage and thermal insulation building material quality detection, a nonlinear differential equation is used to detect the quality of phase change energy storage thermal insulation building material [12], double Bouc-Wen model is used to analyze the seismic strengthening strength of phase change energy storage thermal insulation building material, and the method of series detection of internal pipe and guide shaft is adopted. The seismic prestress distribution of phase change energy storage and thermal insulation building materials is carried out to meet the requirements of:

$$\begin{aligned} 0 \leq & -2 \sum_{i=1}^{n} t_{i1} f_i(y_i(t)) [f_i(y_i(t)) - \rho_i y_i(t)] \\ & - 2 \sum_{i=1}^{n} t_{i2} f_i(y_i(t - \delta(t))) [f_i(y_i(t - \delta(t))) - \rho_i y_i(t - \delta(t))] \\ = & -2 f^T(y(t)) T_1 f(y(t)) - 2 f^T(y(t - \delta(t))) T_2 f(y(t - \delta(t))) \\ & + 2 y^T(t) \Sigma T_1 f(y(t)) + 2 y^T(t - \delta(t)) \Sigma T_2 f(y(t - \delta(t))). \end{aligned} \tag{3}$$

Under the constraint condition of self-reset damping energy dissipation braces, the characteristic expression of building structure quality detection is obtained as follows:

$$\begin{cases} e = z_1 - y \\ \dot{z}_1 = z_2 - \beta_1 e \\ \dot{z}_2 = z_3 - \beta_2 fal(e, 0.5, \delta) \\ \dot{z}_3 = -\beta_3 fal(1, 0.25, \delta) + bu \end{cases} \tag{4}$$

In that formula, z_1, z_2 is the characteristic quantity of the damping energy dissipation support distribution, and y is the characteristic quantity of the load separation, and the test method of the vibration characteristic of the seismic wave output is adopted to carry out the support finite element simulation of the phase-change energy-storage heat-insulation building material, and the state transition equation of the seismic wave is obtained as follows:

$$\frac{\partial}{\partial t}(\rho u_i) + \frac{\partial}{\partial x_j}(\rho u_i u_j) = -\frac{\partial p}{\partial x_i} + \frac{\partial \tau_{ij}}{\partial x_j} + \rho g_i + F_i \tag{5}$$

Wherein

$$\tau_{ij} = [\mu(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i})] - \frac{2}{3}\mu\frac{\partial u_i}{\partial x_i}\delta_{ij} \tag{6}$$

Combined with the double broken line model for quality detection to improve the output stability of phase change energy storage and insulation building materials [13].

3.2 Quality Evaluation of Phase Change Energy Storage and Thermal Insulation Building Materials

According to the stress characteristics and dissipation characteristics of phase change energy storage thermal insulation building materials, the seismic evaluation of phase change energy storage thermal insulation building materials is carried out, and the self-recovery energy dissipation bracing model of phase change energy storage thermal insulation building materials is established [14]. The fusion model of stress characteristic parameters for phase change energy storage thermal insulation building materials quality detection is expressed as follows:

$$\begin{aligned} &\max \quad \Theta_{Q_i} = \tfrac{a_{Q_i}}{a_{Q_i} + c_{Q_i}} \\ &\max \quad \Theta_{E_i} = \tfrac{a_{E_i}}{a_{E_i} + c_{E_i}} \\ &\max \quad \Theta_{C_i} = \tfrac{a_{C_i}}{a_{C_i} + c_{C_i}} \\ &S.t. \quad Q_i \geq Q_{th} \\ &\qquad E_i \geq E_{th} \\ &\qquad C_i \leq C_{th} \\ &Q_{jk} \geq 0, E_{jk} \geq 0, C_{jk} \geq 0 \\ &\sum_{j=1}^{Nj} x_{jk} = 1, \forall i, 1 \leq k \leq M, 1 \leq j \leq N_j \end{aligned} \tag{7}$$

In the above formula, Θ is referred to as the detection statistic under the action of damping energy dissipation support, and the characteristic transfer control is carried out according to the description support hysteresis characteristic, and the viscous coefficient of the damping support material is $\{F_i, F_U\}$, and the degree of association is as follows:

$$\mu_{B_i} = a_{B_i} + b_{B_i}\Delta + c_{B_i}\Phi \tag{8}$$

Wherein, $a_{B_i} = \frac{B_i}{B_U + B_v}$, $b_{B_i} = \frac{(B_U - B_i)(B_i - B_v)}{(B_U + B_v)B_i}$, $c_{B_i} = \frac{B_U B_v}{(B_U + B_v)B_i}$, in the assembly integral model structure, in the early elastic stage and plastic stage, the yield strength of the building structure is S, and the seismic structure frequency S is tested under the condition of fine oblique cracks formed at the angle of the connecting beam. The quality distribution of phase change energy storage and thermal insulation building materials under earthquake action is as follows:

$$s(x) = [N(x), M(x)]^{\mathrm{T}} \tag{9}$$

In the above formula, the $N(x)$ represents the tensile strength, $M(x)$ is the yield response characteristic distribution of the tensile stress, and the peak of the acceleration wave acceleration is input to obtain the power increment:

$$f_t = \frac{\Delta V_t}{V_{t1}} = \frac{V_{t1} - V_{u1}}{V_{t1}} \tag{10}$$

Under the condition that the decrease of the first third order frequency is the same, the elastic-plastic displacement of the building structure is as follows:

$$d_i = d_{ei} + d_{pti} \tag{11}$$

With the peak acceleration of the input tension wave, the characteristic components of the tensile stability detection are obtained as follows:

$$D_e = \sum_i d_{ei} \tag{12}$$

Based on the analysis, the parameter evaluation of phase change energy storage and thermal insulation building material quality inspection is realized [15].

4 Quality Inspection and Optimization of Phase Change Energy Storage and Thermal Insulation Building Materials

4.1 Self-recovery Energy Dissipation Bracing Model for Phase Change Energy Storage and Thermal Insulation Building Materials

Under the constraint of quality parameter index constraint model and neural network control model, the neural network adaptive control method is used to quantitatively evaluate the quality of phase change energy storage and thermal insulation building materials. The internal force distribution of tension resistance is expressed as follows:

$$e(x) = \sum_i d_{ei} D_s B(x).d_e \tag{13}$$

In the formula, $B(x)$ represents the joint characteristic distribution of the self-recovery energy dissipation braces of the phase change energy storage and thermal insulation building materials, and the maximum floor shear force of the integral structure is as follows:

$$B = \begin{bmatrix} -1 & 0 & 0 & -1 & 0 & 0 \\ 0 & 6\xi/L & 3\xi - 1 & 0 & 6\xi/L & 3\xi - 1 \end{bmatrix} \tag{14}$$

Wherein, $\xi \in [-1, 1]$, denotes the order of tension wave, under the constraint of statistical characteristic quantity, the tension action is nonlinear distribution, and the dynamic control equation of steel structure is as follows:

$$\begin{bmatrix} m_b & \\ & m_s \end{bmatrix} \begin{Bmatrix} \ddot{x}_b \\ \ddot{x}_s \end{Bmatrix} + \begin{bmatrix} c_b & -c_b \\ -c_b & c_b + c_s \end{bmatrix} \begin{Bmatrix} \ddot{x}_b \\ \ddot{x}_s \end{Bmatrix} + \begin{bmatrix} k_b & -k_b \\ -k_b & k_b + k_s \end{bmatrix} \begin{Bmatrix} x_b \\ x_b \end{Bmatrix} + \begin{bmatrix} m_b & \\ & m_s \end{bmatrix} \begin{Bmatrix} u_b \\ u_s \end{Bmatrix} = 0 \tag{15}$$

In the above formula, u_b represents the maximum overturning moment and c_s represents the increment of elastic internal force of the section. In the elastic stage, the load of the assembly integral structure is as follows:

$$d_i = \begin{bmatrix} k_b & -k_b \\ -k_b & k_b + k_s \end{bmatrix} \begin{Bmatrix} x_b \\ x_b \end{Bmatrix} + \begin{bmatrix} m_b & \\ & m_s \end{bmatrix} \begin{Bmatrix} u_b \\ u_s \end{Bmatrix} d_{ei} \tag{16}$$

The yield response of phase change energy storage thermal insulation building material is set in advance. The output stress load increases gradually with the order of input tension wave, and the output is as follows:

$$x'_{ij} = x_i - \rho + j\frac{2\rho}{n} \tag{17}$$

In the formula, ρ represents the self-recovery energy dissipation supporting force of the phase-change energy-storage heat-insulating building material under the action of the pulling force, x_i is the maximum interlayer displacement of the assembled integral structure, The quantitative evaluation of the quality of the phase-change energy-storage building material is carried out by using the neural network adaptive control method.

4.2 Quality Inspection of Phase Change Energy Storage and Thermal Insulation Building Materials

The stress distribution characteristic parameters of the thermal insulation material are respectively calculated, the quality detection of the phase-change energy-storage heat-insulation building material is realized, and the model strain increment of the building structure under the iteration conditions of the n + 1, n-step is as follows:

$$d(t) = \begin{cases} \arctan\left(\frac{X'_2(t)}{X'_1(t)}\right), & X'_1(t) > 0 \\ \arctan\left(\frac{X'_2(t)}{X'_1(t)}\right) + \pi, & X'_1(t) < 0,\ t = 1, 2, \ldots, T \\ \pi/2, & X'_1(t) = 0 X'_1(t) = 0 \end{cases} \tag{18}$$

Under the effect of concentrated load, the mass state quantity of the phase-change energy-storage building material is $x_0 (x_0 = [\varphi_0, \dot{\varphi}_0, \theta_o]^T)$, and the overturning moment of the bottom layer under the action of the tension wave is as follows:

$$\begin{cases} mV\Delta\dot{\theta} = \left(c_y^{\alpha} q S_M + P\right)\Delta\alpha + mg \ \sin\theta\Delta\theta + P\Delta\delta_{\varphi} \\ \qquad + m_R l_R \Delta\ddot{\delta}_{\varphi} + F_{gr} \\ J_{Z1}\Delta\ddot{\varphi} = -c_y^{\alpha} q S_M \left(x_g - x_T\right)\Delta\alpha - qS_M m_{dz} l_k^2 \Delta\dot{\varphi}/V \\ \qquad - P(x_R - x_T)\Delta\delta_{\varphi} - m_R \dot{W}_{x1} l_R \Delta\delta_{\varphi} \\ \qquad - m_R l_R \Delta\ddot{\delta}_{\varphi}(x_R - x_T) - J_R \Delta\ddot{\delta}_{\varphi} + M_{gr} \end{cases} \tag{19}$$

Due to the different response values under the action of tensile wave, according to the interstory displacement of building structure, the tensile stress equation of building is obtained as follows:

$$(\frac{1}{2}(u_A^+ - u_A^-) - \frac{1}{2}F_{A_1}, \frac{1}{2}(u_A^+ - u_A^-) - \frac{1}{2}(F_B + F_{A_2})) \tag{20}$$

The stress distribution characteristic parameters of thermal insulation materials are calculated respectively, and the quality detection of phase change energy storage thermal insulation building materials is realized. The expression of yield response characteristic quantity of rectangular plate is defined as follows:

$$C_{ijkl} = 2\frac{1}{V}W^*\overline{\varepsilon_{ij}}\frac{1}{\varepsilon_{ij}^2} \quad i = j, k = l, i = k \tag{21}$$

$$C_{ijkl} = \frac{1}{2V}W^*\overline{\varepsilon_{ij}}\frac{1}{\varepsilon_{ij}^2} \quad i \neq j, k \neq l, i = k, j = l \tag{22}$$

$$C_{ijkl} = \frac{1}{4V}\frac{\left(W^*\overline{\varepsilon_{ij}}\,\overline{\varepsilon_{kl}}\right) - W^*\overline{\varepsilon_{ij}} - W^*\overline{\varepsilon_{kl}}}{\overline{\varepsilon_{ij}}\,\overline{\varepsilon_{kl}}} \quad i \neq j, k \neq l \tag{23}$$

$$C_{ijkl} = \frac{1}{2V}\frac{\left(W^*\overline{\varepsilon_{ij}}\,\overline{\varepsilon_{kl}}\right) - W^*\overline{\varepsilon_{ij}} - W^*\overline{\varepsilon_{kl}}}{\overline{\varepsilon_{ij}}\,\overline{\varepsilon_{kl}}} \quad i = j, k \neq l \tag{24}$$

The quality detection and optimization design of the phase-change energy storage and heat-insulating building material is realized.

5 Experimental Test Analysis

In order to test the application performance of this method in the quality detection of phase change energy storage and thermal insulation building materials, the experimental analysis is carried out. It is assumed that the strength of the input tensile wave is 250 MPa, the curve shape parameter is 1.24, the elastic modulus of phase change energy storage thermal insulation building material $Es = 23.45 \times 10^6$ psi, Mor is 0.43, the valley deflection is 2.45, and the structural parameters are set in Table 1.

Table 1. Parameter description of phase change energy storage and thermal insulation building materials

Finite element point	Coordinate x (m)	Coordinate y (m)	Coordinate z (m)	Stress (N)
1	4.45	5.54	7.56	14.56
2	3.64	9.43	9.78	37.32
3	8.33	8.42	5.73	53.34
4	0.23	6.68	8.34	54.56
5	7.45	8.86	1.56	14.53
6	9.67	6.65	9.78	23.46
7	9.45	3.64	2.65	43.64
8	7.43	2.78	2.63	54.32
9	4.43	3.85	8.45	64.73
10	5.56	5.54	7.52	76.45
11	2.32	7.56	1.32	41.43
12	6.36	3.63	0.45	32.11
13	3.65	8.53	8.34	42.72

According to the above parameters, the quality of phase change energy storage and thermal insulation building materials is tested, and the finite element model is shown in Fig. 2.

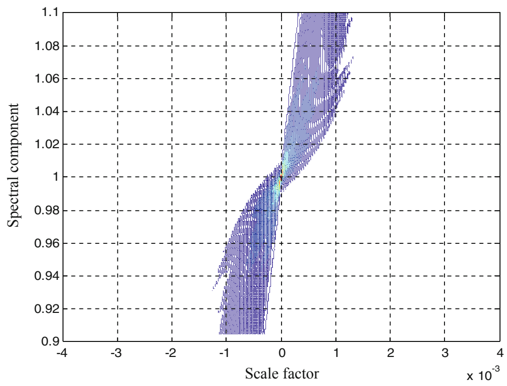

Fig. 2. Finite element model for the detection

According to the detection model of Fig. 2, the quality of phase change energy storage and thermal insulation building materials is tested, and the test results are shown in Fig. 3.

The analysis of Fig. 3 shows that the method can effectively realize the accuracy of phase change energy storage thermal insulation building material quality detection, the accuracy of parameter evaluation is good, and has good quality detection ability. It has good application value in phase change energy storage thermal insulation building material tension resistance and disaster prevention.

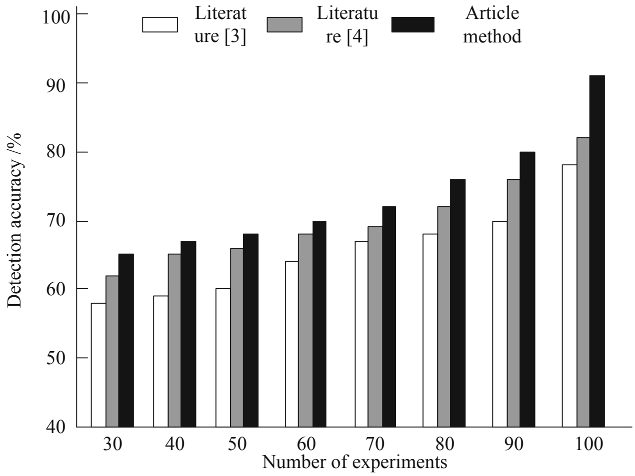

Fig. 3. Quality test results of phase change energy storage and thermal insulation building materials

In order to further verify the effectiveness of the method in this paper, the error of phase change energy storage and thermal insulation building material quality test results of the method in this paper, the method in literature [3] and the method in literature [4] are compared and analyzed, and the comparison results are shown in Fig. 4.

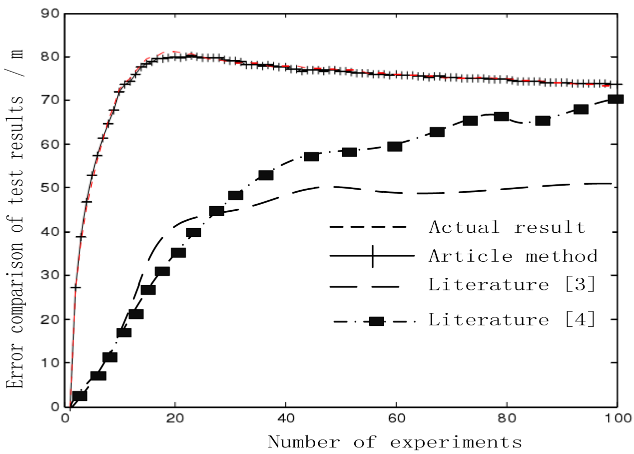

Fig. 4. Error comparison of test results

According to Fig. 4, the fitting degree between the quality test results of phase change energy storage and thermal insulation building materials in this method and the actual test results is 100%, while the quality test results of phase change energy storage and thermal insulation building materials in literature [3] and literature [4] are quite different from the actual test results, indicating that this method has a high quality test effect of phase change energy storage and thermal insulation building materials.

6 Conclusions

In conclusion, the quality detection technology of the heat-insulating building material can be reasonably applied, and the quality of the materials applied to the construction of the building construction can be ensured to be in accordance with the engineering requirements, and the construction work can be successfully completed, so that the construction progress and the quality of the building are guaranteed, It is of great significance to reduce the construction effect of the project. In the background of the continuous construction of the modern building construction, the types of the building construction materials are increased, and the quality detection technology of the engineering materials also has higher requirements, which requires the relevant construction personnel to have a deep understanding of the importance of the quality of the material quality detection, In addition, the quality inspection of the material is carried out in combination with the engineering demand, which lays a theoretical foundation for promoting the overall development of the building construction enterprises in China.

In order to improve that strength of the phase-change energy-storage heat-insulation building material by analyzing the quality of the phase-change energy-storage heat-insulation building material, the strength of the phase-change energy-storage heat-insulation building material is improved, and the quality detection method of the phase-change energy-storage heat-insulation building material based on the neural network is proposed the invention discloses a support finite element simulation analysis model for building a phase-change energy-storage heat-insulation building material, the quantitative evaluation of the quality of the phase-change energy-storage and heat-insulating building material is carried out by adopting a neural network adaptive control method, the stress distribution characteristic parameters of the thermal insulation material are calculated respectively, and the quality detection of the phase-change energy-storage heat-insulation building material is the method has the advantages of high accuracy of quality detection of the phase-change energy-storage heat-insulation building material by adopting the method, good accuracy of parameter evaluation, good quality detection capability and good engineering application value. Because this paper does not consider the detection time when studying the quality detection method of phase change energy storage and thermal insulation building materials based on neural network, in the future research, the detection time is taken as the experimental index to further verify the effectiveness of this method.

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