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Research Article

Development Path Planning of Sports and Wellness Town under the Background of Computer Virtual Reality Technology

Lichun Chen\(^1\) and Bingxu Lu\(^2\)

\(^1\)Department of Physical Education, Boda College of Jilin Normal University, Siping 136000, China

\(^2\)College of Physical Education, Jilin Normal University, Siping 136000, China

Correspondence should be addressed to Bingxu Lu; lubingxu@jlnu.edu.cn

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In order to improve the planning effect of the development path of the sports and wellness town, this article combines computer virtual technology to analyze the development path planning of the sports and wellness town and conducts research on the effect of the development path planning of the sports and wellness town through simulation research. Moreover, in order to deal with unknown time-varying actuator faults and uncertain disturbances of the system, an improved cost function is constructed in this article, which guarantees the expected performance index of the original system. In addition, this article uses the single-network ADP algorithm to solve the event-triggered HJB equation and adopts a new weight update law. Finally, an event-triggered near-optimal controller is obtained when evaluating the network’s success in approximating the improved cost function. The simulation study shows that the development path planning method of sports and wellness town based on computer virtual reality technology proposed in this article has a good effect and can effectively promote the progress and development of sports and wellness town.

1. Introduction

The wellness industry is a derivative industry that arises as people pursue a wellness life. It is a new format and form. With the improvement in people's living consumption level, wellness’s tourism consumption model is more and more popular. The integration of sports tourism and wellness industry utilizes the advantages of both, integrates the characteristics of the sports industry, and uses sports tourism as an intermediary to achieve the purpose of wellness [1]. The integration of sports tourism and wellness industry is a new model of wellness town that relies on the wellness industry to hold sports events based on scenic spots and features sports elements combined with the local climate and environment. According to the characteristics of the scenic spot, it has been formed into a composite wellness sports tourism product and a folk traditional sports experience tour. Moreover, it provides new possibilities for the development of the sports industry and a new path for the development of sports tourism [2].

At present, people have great demand for wellness, and the integration of the wellness industry has become the mainstream trend in the market and the development trend in the times. For this wave of development, we should continue to explore the path of integration and development of sports tourism and wellness industry, and a new tourism method, the form of integration of sports and wellness industry, came into being [3].

In the integrated development of the wellness industry and the sports industry, the definition of the integration of the wellness industry and the sports industry is mainly defined from the perspective of economic research. In modern tourism economics, wellness tourism is the most important form of the wellness industry. Specifically, it refers to the tourism activities that tourists can improve their physical and mental literacy in the process of tourism, such as bungee jumping, rafting, adventure, and other leisure sports. In addition, it also refers to tourism products that are organically combined with tourism resources and based on the purpose of paying attention to and caring for human
health, such as tourism route design, medical wellness tourism product design, resorts, etc [4]. Secondly, the so-called sports industry, especially the sports industry that is integrated with the wellness industry, is mainly a collection or system of enterprises consisting of tourism product development activities with three main components: the development of economic activities with recreational sports value, the provision of recreational sports living facilities, and the value function of recreational sports tourism, mainly for the purpose of outdoor sports [5]. From the perspective of modern tourism economics, both the wellness industry and leisure sports pay more attention to the improvement in tourists' physical and mental literacy in terms of conceptual connotation, so as to meet the needs of consumers for development. Furthermore, industrial integration refers to an economic phenomenon. With the progress of science and technology and the relaxation of economic control policies, different industries or different industries of the same industry have shown a trend in overlapping development in the development and utilization of the market and technology network platforms. Moreover, they form new industrial attributes and product forms in a way of interweaving and infiltrating [6]. Finally, the integrated development of the wellness industry and the sports industry is the result of the current strong correlation between my country's tourism industry, better macro policies, and fierce market competition. Moreover, the development trend in the wellness industry and the sports industry integration is obvious. It is a new type of tourism mode that emphasizes the difference between the wellness and sports industry, in order to achieve better market share and market potential mining and better meet the needs of consumers. At the same time, it is a new model of comprehensive three-dimensional development that widely combines tourism, agriculture, industry and the tertiary industry in the service industry, high-tech industry, sports industry, and cultural education industry [7].

The introduction of the concept of ecological sports is the inevitable result of social development. After human beings have experienced industrial civilization, the social economy has developed significantly, and people's living environment and living standards have been significantly improved. However, it is accompanied by increasingly serious natural environment problems, the ecological balance has been destroyed, and ecological problems have become a consistent problem faced by all countries in the world [8]. Ecological sports have the characteristics of nature, culture, and society, and it follows the harmonious development of man and nature, society, and sports. Moreover, the protection of ecology and the rational use of ecological resources have become the consensus reached in today's world. Therefore, according to the characteristics of ecological sports, it is necessary to give full play to its social attributes, and through the combination of ecology and sports to promote economic progress, stimulate the rigid demand for employment and alleviate social conflicts. In addition, ecological sports emphasize the mutual integration and harmonious coexistence of man and nature. In the process of participating in ecological sports activities, people always adhere to this principle and protect the big family on which we depend. The literal meaning of ecological sports is not the so-called native and original sports form, but a serious social problem that people in modern society realize after experiencing the natural crisis and need to be protected urgently. The natural environment is the shelter for human survival, and the health of the human body is largely affected by the natural environment, so the concept of ecological sports that integrates with nature came into being [9].

It is a problem how wellness leisure sports tourism can achieve the purpose of improving the quality of life of tourists in tourist destinations with recuperation factors. At present, foreign wellness tourism pays great attention to health infrastructure and health service projects [10]. Through entertainment, fitness, and self-cultivation, tourists are encouraged to achieve a harmonious and healthy state [11]. With the increase of age, the change of lifestyle, the intensification of work and life pressure, and other reasons, many organs of the human body will appear unbalanced aging and subhealth state. Therefore, health needs to be "managed." The highest state of "management" is "to cure the disease before it does not cure the disease already." The connotation of "management" is to proactively prevent, maintain, or achieve "not getting sick." If the patient is already "sick" and then performs "management," it is to stop the horse and dig a well when thirsty. Moreover, some diseases, especially chronic diseases, cannot be treated with long-term medication, and hospitals are instead remedial and auxiliary treatments. Therefore, scientific exercise, nutritious diet, positive attitude, acquisition of motor skills, etc., have become the key and guaranteed treatment methods when visiting tourist destinations with convalescent factors. In the tourism environment with convalescent factors, the carrier of wellness leisure sports tourism to play the greatest effect of health care and pension lies in the organic integration of sports, leisure, exercise, and health care and pension [12]. In view of the differences in physical constitutions of "not sick," "about to be sick," and "already sick," as well as the age difference between the old, middle, and young, it is necessary to scientifically formulate personalized and tailored services and issue "prescriptions" for health care, elderly care, sports, and leisure. At the same time, it is necessary to promote active and effective sports and healthy lifestyle, integrating traditional health care culture, traditional Chinese medicine health care, Confucianism, Buddhism and Taoism health care, food culture health care and other leisure health care elements, sports science, traditional sports and other sports elements, modern medical care, and "treatment of the future" and other health management methods to effectively manage and intervene in health. Thus, it can achieve the purpose of preventing and treating diseases; enhancing physical fitness, body rehabilitation, medical care, beauty, self-cultivation, and prolonging life; and improving, enhancing, and maintaining the physical and mental health of tourists [13].

Leisure sports are different from public welfare sports and social sports in the traditional sense, and leisure sports are more autonomous and interesting, and there are no rigid requirements for sports forms. Moreover, leisure sports are
relatively more flexible, and you can choose to participate in sports activities or sports practice in your spare time, and effective linkage and interaction can be formed between different sports items, which greatly enriches the sports content of leisure sports. The wellness industry is an important part of the development of the health care industry [14]. With the rise of the health care industry and the health care economy, market capital has intervened in the development of the health care industry, making the wellness industry attract attention in the context of healthy China and become an important part of the development of health care. The development of the health-preserving industry in the traditional sense is limited to providing services for middle-aged and elderly groups. The development of the wellness industry involves many social groups such as teenagers, middle-aged and elderly people, pregnant women, and infants, and it covers a wider range and the wellness forms are rich and diverse. On the one hand, based on agricultural wellness, it can help the development of rural tourism service industry and solve mental health problems by providing tourism services [15]. On the other hand, around the construction of a diversified wellness service system, a variety of wellness services can be provided from the aspects of community elderly care, rehabilitation physiotherapy, nursing, and health consultation. Therefore, the development of the wellness industry is directly related to the development of healthy China. The establishment of a wellness industrial service system with regional characteristics in various places will play a positive role in improving the healthy living standards of the people. In the future stage, the integration and development of leisure sports and wellness industry is imperative [16].

This article combines computer virtual technology to analyze the development path planning of the sports wellness town. Through the simulation research, the effect of the development path planning of the sports wellness town can be studied, and the development effect of the sports wellness town can be effectively improved.

2. Virtual Simulation Optimization Control of Sports Wellness Town

2.1. Curved Grids and Coordinate Transformations. The corresponding relationship between the grid points in the rectangular coordinate system and the curvilinear coordinate system is:

\[
\begin{align*}
\frac{\partial x}{\partial \rho} + \frac{\partial x}{\partial \theta} \frac{\partial \theta}{\partial x} &= 1, \\
\frac{\partial y}{\partial \rho} + \frac{\partial y}{\partial \theta} \frac{\partial \theta}{\partial y} &= 1, \\
\frac{\partial z}{\partial \rho} + \frac{\partial z}{\partial \theta} \frac{\partial \theta}{\partial z} &= 1, \\
\frac{\partial \rho}{\partial x} &= \cos \theta, \\
\frac{\partial \theta}{\partial x} &= -\rho \sin \theta, \\
\frac{\partial \rho}{\partial y} &= \sin \theta, \\
\frac{\partial \theta}{\partial y} &= \rho \cos \theta,
\end{align*}
\]

where \(x\) and \(z\) are functions of \(\rho, \theta\). According to the chain rule, by derivation of \(x\) and \(z\) on both sides of the equation, we can get:

\[
\begin{align*}
\frac{\partial x}{\partial \rho} &= \cos \theta, \\
\frac{\partial x}{\partial \theta} &= -\rho \sin \theta, \\
\frac{\partial y}{\partial \rho} &= \sin \theta, \\
\frac{\partial y}{\partial \theta} &= \rho \cos \theta,
\end{align*}
\]

From formula (2), the derivatives \(\frac{\partial \rho}{\partial x}, \frac{\partial \theta}{\partial x}, \frac{\partial \rho}{\partial z},\) and \(\frac{\partial \theta}{\partial z}\) of \(\rho, \theta\) about \(x\) and \(z\) are solved:

\[
\begin{align*}
\frac{\partial \rho}{\partial x} &= \frac{1}{\rho}, \\
\frac{\partial \theta}{\partial x} &= \frac{\sin \theta}{\rho}, \\
\frac{\partial \rho}{\partial z} &= \frac{1}{\rho}, \\
\frac{\partial \theta}{\partial z} &= \frac{\cos \theta}{\rho},
\end{align*}
\]

The solution process of \(J\) is as follows:

\[
\begin{align*}
\frac{\partial x}{\partial \rho} &= \cos \theta, \\
\frac{\partial x}{\partial \theta} &= -\rho \sin \theta, \\
\frac{\partial y}{\partial \rho} &= \sin \theta, \\
\frac{\partial y}{\partial \theta} &= \rho \cos \theta,
\end{align*}
\]

It is known that the variable \(p, 0\) of the curved coordinate system is used to represent the function corresponding relationship of the variables \(x\) and \(z\) of the rectangular coordinate system. Therefore, the partial derivatives of the variables in the rectangular coordinate system to the variables in the curved coordinate system can be obtained, and the Jacobian matrix \(J\) of the coordinate transformation coefficients can be obtained. At this time, the partial derivatives of the parameters of the curved coordinate system to the parameters of the rectangular coordinate system can be obtained through \(J\) inverse. Thus, the mutual conversion of the partial derivatives in the rectangular system where the physical area is located and the partial derivatives of the respective variables in the curved coordinate system where the calculation area is located is realized.

The curved grid is the transformation of the irregular physical space into a regular grid that is easy to calculate by the computer through coordinate transformation. The
undulating interface taken above is a special case in a special curved coordinate system. In this regard, we do further abstraction and generalization, and when the undulating interface or the ground surface is a general derivable smooth function, the corresponding relationship between the rectangular system and the curved coordinate system is as in formula (5).

The mapping relationship between the known physical area and the computing area is as follows:

\[
\begin{align*}
x &= x(\xi, \eta), \\
z &= z(\xi, \eta),
\end{align*}
\]

where \(x\) and \(z\) are functions of \(\xi, \eta\), and the two sides of the formula are derived from \(x\) and \(z\) respectively to obtain:

\[
\begin{align*}
1 &= \frac{\partial x}{\partial \xi} \frac{\partial \xi}{\partial x} + \frac{\partial x}{\partial \eta} \frac{\partial \eta}{\partial x}, \\
0 &= \frac{\partial x}{\partial \xi} \frac{\partial \xi}{\partial z} + \frac{\partial x}{\partial \eta} \frac{\partial \eta}{\partial z}, \\
0 &= \frac{\partial z}{\partial \xi} \frac{\partial \xi}{\partial x} + \frac{\partial z}{\partial \eta} \frac{\partial \eta}{\partial x}, \\
1 &= \frac{\partial z}{\partial \xi} \frac{\partial \xi}{\partial z} + \frac{\partial z}{\partial \eta} \frac{\partial \eta}{\partial z},
\end{align*}
\]

where \(\frac{\partial x}{\partial \xi}, \frac{\partial x}{\partial \eta}, \frac{\partial z}{\partial \xi}, \) and \(\frac{\partial z}{\partial \eta}\) are known quantities. Then, it can be solved from formula (6) [17]:

\[
\begin{align*}
\frac{\partial \xi}{\partial x} &= \frac{1}{J} \frac{\partial x}{\partial \eta} \frac{\partial \eta}{\partial z} = \frac{1}{J} \frac{\partial x}{\partial \eta}, \\
\frac{\partial \eta}{\partial x} &= \frac{1}{J} \frac{\partial x}{\partial \eta} \frac{\partial \eta}{\partial z} = \frac{1}{J} \frac{\partial x}{\partial \eta},
\end{align*}
\]

where

\[
J = \begin{vmatrix} \frac{\partial x}{\partial \xi} & \frac{\partial x}{\partial \eta} \\ \frac{\partial z}{\partial \xi} & \frac{\partial z}{\partial \eta} \end{vmatrix},
\]

\[
= \frac{\partial x}{\partial \xi} \frac{\partial z}{\partial \eta} - \frac{\partial x}{\partial \eta} \frac{\partial z}{\partial \xi}.
\]

Using the chain derivation rule and the variable element conversion formula (7) of the rectangular coordinate system, the stress-velocity equation in the rectangular coordinate system can be processed, and the stress-velocity equation in the curved coordinate system can be obtained as follows:

\[
\begin{align*}
\rho \frac{\partial V_x}{\partial t} &= \frac{\partial \sigma_{xx}}{\partial x} + \frac{\partial \sigma_{xz}}{\partial z} + \frac{\partial \sigma_{x\eta}}{\partial \eta} + \frac{\partial \sigma_{x\xi}}{\partial \xi} + \frac{\partial \sigma_{x\zeta}}{\partial \zeta}, \\
\rho \frac{\partial V_z}{\partial t} &= \frac{\partial \sigma_{zz}}{\partial x} + \frac{\partial \sigma_{zz}}{\partial z} + \frac{\partial \sigma_{z\eta}}{\partial \eta} + \frac{\partial \sigma_{z\zeta}}{\partial \zeta}, \\
\frac{\partial \sigma_{xx}}{\partial t} &= (\lambda + 2\mu) \left[ \frac{\partial V_x}{\partial \xi} \frac{\partial \xi}{\partial x} + \frac{\partial V_x}{\partial \eta} \frac{\partial \eta}{\partial x} \right] + \lambda \left[ \frac{\partial V_x}{\partial \xi} \frac{\partial \xi}{\partial x} + \frac{\partial V_x}{\partial \eta} \frac{\partial \eta}{\partial x} \right], \\
\frac{\partial \sigma_{zz}}{\partial t} &= \lambda \left[ \frac{\partial V_z}{\partial \xi} \frac{\partial \xi}{\partial x} + \frac{\partial V_z}{\partial \eta} \frac{\partial \eta}{\partial x} \right] + (\lambda + 2\mu) \left[ \frac{\partial V_z}{\partial \xi} \frac{\partial \xi}{\partial x} + \frac{\partial V_z}{\partial \eta} \frac{\partial \eta}{\partial x} \right], \\
\frac{\partial \sigma_{x\eta}}{\partial t} &= \mu \left[ \frac{\partial V_x}{\partial \xi} \frac{\partial \xi}{\partial x} + \frac{\partial V_x}{\partial \eta} \frac{\partial \eta}{\partial x} \right] + \frac{\partial V_x}{\partial \eta} \frac{\partial \eta}{\partial x} + \frac{\partial V_z}{\partial \eta} \frac{\partial \eta}{\partial x} \right].
\end{align*}
\]

For the convenience of expression, the symbol \(f_x = \partial f / \partial x\) is introduced, then formula (9) can be expressed as:

\[
\begin{align*}
\rho v_{x, x} &= \xi_x \sigma_{xx, x} + \xi_z \sigma_{xz, x} + \eta_x \sigma_{x\eta, x} + \eta_z \sigma_{x\zeta, x}, \\
\rho v_{x, z} &= \xi_x \sigma_{xz, x} + \xi_z \sigma_{zz, x} + \eta_x \sigma_{z\eta, x} + \eta_z \sigma_{z\zeta, x}, \\
\sigma_{x, x} &= (\lambda + 2\mu) \xi_x v_{x, x} + \lambda \xi_z v_{x, z} + (\lambda + 2\mu) \eta_x v_{x, \eta} + \lambda \eta_z v_{x, \zeta}, \\
\sigma_{z, z} &= \lambda \xi_x v_{x, z} + \lambda \xi_z v_{z, x} + \eta_x \sigma_{z, x, \eta} + (\lambda + 2\mu) \eta_z v_{x, \zeta}, \\
\sigma_{x, \eta} &= \mu (\xi_x v_{x, \eta} + \xi_z v_{z, \eta} + \eta_x v_{x, \zeta} + \eta_z v_{z, \zeta}).
\end{align*}
\]

The above formula can be expressed as a matrix:

\[
W = \begin{bmatrix} A \cdot W_{\hat{x}} + B \cdot W_{\hat{\eta}} \end{bmatrix},
\]

where

\[
W = \begin{bmatrix} v_x & v_z & \sigma_{xx} & \sigma_{xz} \end{bmatrix},
\]

\[
A = \begin{bmatrix} 0 & 0 & \xi_z / \rho & 0 & \xi_x / \rho \\
0 & 0 & 0 & \xi_z / \rho & \xi_x / \rho \\
\chi \xi_x & \chi \xi_z & 0 & 0 & 0 \\
\lambda \xi_x & \chi \xi_z & 0 & 0 & 0 \\
\mu \xi_z & \mu \xi_x & 0 & 0 & 0 \end{bmatrix},
\]

\[
B = \begin{bmatrix} 0 & 0 & \eta_z / \rho & \eta_x / \rho \\
0 & 0 & 0 & \eta_z / \rho & \eta_x / \rho \\
\chi \eta_x & \lambda \eta_z & 0 & 0 & 0 \\
\lambda \eta_x & \chi \eta_z & 0 & 0 & 0 \\
\mu \eta_z & \mu \eta_x & 0 & 0 & 0 \end{bmatrix}.
\]

2.2. Finite Difference of Staggered Grid. Due to its simplicity and flexibility, the finite difference method has been greatly loved by scholars since the finite difference method was
introduced into the field of virtual line work and has been widely used in various virtual line wave field numerical calculations. Today, finite differences are ubiquitous in the field of virtual line exploration. Among these finite difference methods, some are the finite difference method of the discrete second-order elastic wave equation (referred to as the displacement wave equation, that is the motion balance equation) and some are staggered grid finite difference methods for discretizing first-order stress-velocity elastic wave equations (stress-velocity equations). As discussed in the previous section, the discrete first-order stress-velocity equation has obvious advantages over the discrete second-order displacement wave equation. Therefore, this chapter mainly discusses the finite difference method for discretizing the stress-velocity equation using a staggered grid and does not discretize the displacement wave equation.

The traditional finite difference method for discretizing the displacement wave equation involves second-order partial derivatives, which reduces the calculation accuracy. Moreover, the finite difference method for the displacement wave equation also needs to discretize the elastic parameters of the medium, which reduces the computational efficiency. However, the discrete stress-velocity equation does not involve higher-order partial derivatives, and the simulation calculation accuracy is higher and the convergence speed is faster. It staggering the five-wave field components involved in the first-order stress-velocity equation in time and space, avoids the derivation of elastic parameters, and has a wider range of applications. Therefore, it can numerically simulate more complex media than traditional methods.

The main steps of staggered mesh discretization of the first-order stress-velocity equation are as follows: The first step is to convert the displacement wave equation into a stress-velocity equation and convert the equation containing the second-order partial derivative into an equation containing only the first-order partial derivative. The second step is to distribute the five-wave field components in the first-order stress-velocity equation on the grid nodes of the model in a regular and orderly manner. The third step is to discretize the first-order partial derivative with respect to time in the equation, and obtain a time difference format with 2M-order accuracy according to the calculation accuracy requirements. The fourth step is to discretize the space dimension of the first-order stress-velocity equation, that is to discretize the first-order partial derivatives of the equation with respect to space (in the two-dimensional case, the first-order partial derivatives of x and z). Thereafter, the spatial difference format with 2N-order precision is obtained according to the calculation precision requirements. The fifth step is to finally obtain the complete staggered grid difference format of the first-order stress-velocity wave equation in time and space. From the initial 0 time to the maximum time at the end of the simulation, it gradually calculates the values of the three components of stress and the two components of velocity at each moment from front to back. Finally, the calculation is completed for all points in the calculation area and at all times. So far, the forward modeling of the wave equation by the staggered grid finite difference method is realized.

Next, this article specifically describes the specific calculation process of the staggered grid finite difference method. Moreover, this article explains how to achieve interleaving in time and space, how to obtain a differential format with 2N-order precision in space, how to obtain a 2M-order differential format in time, and how to calculate the corresponding wave field value at the next moment step by step.

Since functions can only calculate finite discrete functions, continuous function variables must be discretized and infinite function variables must be limited before using a computer for numerical simulation. Therefore, when using a computer to simulate the virtual line wave field, it is necessary to discretize the continuous wave equation and add artificial boundaries to the virtual line wave propagating in the semi-infinite medium region in real conditions. When the first-order stress-velocity equation is numerically simulated, it must be discretized, and finite difference is used to approximate the equation. When the grid is appropriate, its result is very close to the analytical solution of the equation. As mentioned in the introduction of the calculation principle above, the five components of the wave field are distributed alternately in time and space, and the calculation interval between the alternate calculation of velocity and stress differs by half a time step (Δt/2). The wave field quantity is expanded into a series with time as a variable by Taylor series. Taking vx as an example, vx (t = Δt/2) and vx (t − Δt/2) are expanded at t by Taylor’s formula:

\[
v_x(t + \frac{\Delta t}{2}) = v_x(t) + \frac{\partial v_x}{\partial t} \frac{\Delta t}{2} + \frac{1}{2!} \frac{\partial^2 v_x}{\partial t^2} \left(\frac{\Delta t}{2}\right)^2 + \frac{1}{3!} \frac{\partial^3 v_x}{\partial t^3} \left(\frac{\Delta t}{2}\right)^3 + \cdots + \frac{1}{m!} \frac{\partial^m v_x}{\partial t^m} \left(\frac{\Delta t}{2}\right)^m + o(\Delta t^m),
\]

\[
v_x(t - \frac{\Delta t}{2}) = v_x(t) + \frac{\partial v_x}{\partial t} \frac{\Delta t}{2} + \frac{1}{2!} \frac{\partial^2 v_x}{\partial t^2} \left(\frac{\Delta t}{2}\right)^2 - \frac{1}{3!} \frac{\partial^3 v_x}{\partial t^3} \left(\frac{\Delta t}{2}\right)^3 + \cdots + \frac{1}{m!} \frac{\partial^m v_x}{\partial t^m} \left(-\frac{\Delta t}{2}\right)^m + o(\Delta t^m).
\]

By subtracting the following formula from the above formula, we get:

\[
v_x(t + \frac{\Delta t}{2}) = v_x(t - \frac{\Delta t}{2}) + 2 \sum_{m=1}^{M} \frac{\Delta t}{(2m-1)!} \frac{\partial^{2m-1} v_x}{\partial t^{2m-1}} \left(\frac{\Delta t}{2}\right)^{2m-1} + o(\Delta t^{2m}).
\]

If M = 1 is taken when solving the time derivative, then:

\[
v_x(t + \frac{\Delta t}{2}) = v_x(t - \frac{\Delta t}{2}) + \frac{\Delta t}{2} \frac{\partial v_x}{\partial t} + o(\Delta t^3).
\]
\[ v_x(t + \frac{\Delta t}{2}) = v_x(t - \frac{\Delta t}{2}) + \frac{\Delta t}{\rho} \left( \frac{\partial \sigma_{xx}}{\partial x} + \frac{\partial \sigma_{xx}}{\partial z} \right). \]  

From the central difference formula and formula ignoring high-order infinitesimals, the second-order time approximate difference format of \( v_x \) is obtained as:

\[ v_x(t + \frac{\Delta t}{2}) = v_x(t - \frac{\Delta t}{2}) + \Delta t \left( \frac{\partial \sigma_{xx}}{\partial x} + \frac{\partial \sigma_{xx}}{\partial z} \right). \]

Similarly to the above process of solving the second-order time difference scheme of \( v_x \), the five-component wave field of the first-order stress-velocity equation can be expanded by Taylor’s formula, namely:

\[
\begin{align*}
\sigma_{xx}(t + \frac{\Delta t}{2}) & = \sigma_{xx}(t - \frac{\Delta t}{2}) + \Delta t \left[ C_{1111} \frac{\partial v_x}{\partial x} + C_{1113} \frac{\partial v_z}{\partial x} \right], \\
\sigma_{zz}(t + \frac{\Delta t}{2}) & = \sigma_{zz}(t - \frac{\Delta t}{2}) + \Delta t \left[ C_{1133} \frac{\partial v_x}{\partial z} + C_{3333} \frac{\partial v_z}{\partial z} \right], \\
\sigma_{xz}(t + \frac{\Delta t}{2}) & = \sigma_{xz}(t - \frac{\Delta t}{2}) + \Delta t \left[ C_{4411} \frac{\partial v_x}{\partial x} + C_{4433} \frac{\partial v_z}{\partial z} \right].
\end{align*}
\]

When \( M \) is greater than 1, more time layers are involved, which will occupy a large amount of memory, which is inconvenient for calculation. The relationship between time and space of the first-order stress-velocity equation can be used to convert the partial derivative of stress to time to the partial derivative of velocity to space, and the partial derivative of velocity to time to the partial derivative of stress to space. If there is a high calculation requirement for the time difference accuracy in the process of wave field simulation, a high-order difference approximation in time is required. Through this partial derivative conversion from the time domain to the space domain, the wave field value calculation with high time difference accuracy can be achieved on the premise of generating fewer time layers and occupying less storage space. It can not only ensure high accuracy in time, but also does not need too many wave field values at the moment. That is to say, when calculating the wave field value at a certain moment, we only need to know the wave field value at the previous moment and the wave field value corresponding to the half-time node sandwiched between the two, which is similar to the case where \( M \) is 1.

For example, when \( M = 2 \), the fourth-order time difference of the velocity component \( v_x \) is approximately:

\[ v_x(t + \frac{\Delta t}{2}) = v_x(t - \frac{\Delta t}{2}) + \frac{\partial v_x}{\partial t} \Delta t + \frac{\Delta t^3 \partial^3 v_x}{24 \partial t^3}. \]

Odd derivatives in time are converted to derivatives in space:

\[
\begin{align*}
\frac{\partial v}{\partial t} & = \frac{1}{\rho} \left( \frac{\partial \sigma_{xx}}{\partial x} + \frac{\partial \sigma_{xx}}{\partial z} \right), \\
\frac{\partial^3 v}{\partial t^3} & = \frac{\partial^2}{\partial t^2} \left( \frac{\partial v_x}{\partial t} \right) = \frac{1}{\rho} \frac{\partial^2}{\partial t^2} \left( \frac{\partial \sigma_{xx}}{\partial x} + \frac{\partial \sigma_{xx}}{\partial z} \right), \\
& = \frac{1}{\rho} \left[ (\lambda + 2\mu) \frac{\partial^3 \sigma_{xx}}{\partial x^3} + (2\lambda + 3\mu) \frac{\partial^3 \sigma_{sx}}{\partial x \partial z^2} + (\lambda + \mu) \frac{\partial^3 \sigma_{sz}}{\partial x \partial z^2} + \mu \frac{\partial^3 \sigma_{zz}}{\partial z^3} \right].
\end{align*}
\]

Then, the fourth-order time approximate difference format of \( v_x \) is:

\[ v_x(t + \frac{\Delta t}{2}) = v_x(t - \frac{\Delta t}{2}) + \frac{\Delta t}{\rho} \left( \frac{\partial \sigma_{xx}}{\partial x} + \frac{\partial \sigma_{xx}}{\partial z} \right) + \frac{\Delta t^3}{24\rho^2} \left[ (\lambda + 2\mu) \frac{\partial^3 \sigma_{xx}}{\partial x^3} + (2\lambda + 3\mu) \frac{\partial^3 \sigma_{sx}}{\partial x \partial z^2} + (\lambda + \mu) \frac{\partial^3 \sigma_{sz}}{\partial x \partial z^2} + \mu \frac{\partial^3 \sigma_{zz}}{\partial z^3} \right]. \]

Similarly, other higher-order time difference approximations can also be obtained by this transformation grafting method.

2.3. 2N-Order Difference Approximation Scheme in Space

This article mainly discusses the two-dimensional isotropic medium in the \( x-o-z \) plane. \( r \) is distributed on the whole grid.
points of the discrete grid, and the remaining wave field quantities \( v \ldots o \) are distributed on the half grid points of the discrete grid.

\[
\sum_{n=1}^{N} C_n \left[ \sigma_{xx} \left[ x + \frac{\Delta x}{2} (2n - 1) \right] - \sigma_{xx} \left[ x - \frac{\Delta x}{2} (2n - 1) \right] \right],
\]

\[
= \frac{2}{3!} \left( \frac{1}{2} \right)^3 C_1 + \left( \frac{3}{2} \right)^3 C_2 + \left( \frac{5}{2} \right)^3 C_3 + \cdots + \left( \frac{2N-1}{2} \right)^3 C_N \frac{\partial^3 \sigma_{xx}}{\partial x^3} \Delta x^3 + ,
\]

\[
= \frac{2}{5!} \left( \frac{1}{2} \right)^5 C_1 + \left( \frac{3}{2} \right)^5 C_2 + \left( \frac{5}{2} \right)^5 C_3 + \cdots + \left( \frac{2N-1}{2} \right)^5 C_N \frac{\partial^5 \sigma_{xx}}{\partial x^5} \Delta x^5 + ,
\]

\[
\ldots
\]

\[
= \frac{2}{(2N-1)!} \left( \frac{1}{2} \right)^{2N-1} C_1 + \left( \frac{3}{2} \right)^{2N-1} C_2 + \left( \frac{5}{2} \right)^{2N-1} C_3 + \cdots + \left( \frac{2N-1}{2} \right)^{2N-1} C_N \frac{\partial^{2N} \sigma_{xx}}{\partial x^{2N-1}} \Delta x^{2N-1} .
\]  

(21)

The above summation formula is approximately simplified, only the first-order partial derivative term \( \frac{\partial \sigma_{xx}}{\partial x} \) is retained, and its coefficient is 1, and the rest of the higher-order partial derivative terms are all 0 to obtain a 2N-order differential coefficient matrix:

\[
\begin{bmatrix}
1 & 3 & 5 & \cdots & 2N-1 \\
1^3 & 3^3 & 5^3 & \cdots & (2N-1)^3 \\
1^5 & 3^5 & 5^5 & \cdots & (2N-1)^5 \\
\vdots & \vdots & \vdots & \ddots & \vdots \\
1^{2N-1} & 3^{2N-1} & 5^{2N-1} & \cdots & (2N-1)^{2N-1}
\end{bmatrix}
\begin{bmatrix}
C_1 \\
C_2 \\
C_3 \\
\vdots \\
C_N
\end{bmatrix}
= \begin{bmatrix} 1 \\ 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix} .
\]

(22)

The difference weight coefficient \( C_n \) is related to the difference order 2N. The difference weight coefficients corresponding to some commonly used orders are given below:

- If \( 2N = 4 \), \( C_1^{(2)} = 1.125; C_2^{(2)} = -0.417; \)
- If \( 2N = 6 \), \( C_1^{(3)} = 1.172; C_2^{(3)} = -0.065; C_3^{(3)} = -0.005; \)
- If \( 2N = 8 \), \( C_1^{(4)} = 1.196; C_2^{(4)} = -0.080; C_3^{(4)} = 0.019; C_4^{(4)} = -0.001. \)

In this article, the eighth-order spatial difference is used. After the above derivation, the 2N-order difference approximation of the first-order partial derivative of \( \sigma_{xx} \) in the \( x \) direction can be finally obtained:

\[
\frac{\partial \sigma_{xx}}{\partial x} = \frac{1}{\Delta x} \sum_{n=1}^{N} C_n \left[ \sigma_{xx} \left[ x + \frac{\Delta x}{2} (2n - 1) \right] - \sigma_{xx} \left[ x - \frac{\Delta x}{2} (2n - 1) \right] \right] + o(\Delta x^{2N}).
\]

(23)

Similar to the above derivation process, the difference approximation format of the remaining four wavefield components can be obtained. The difference approximation scheme of the first-order stress-velocity equation solved by staggered grid can be obtained by bringing the difference scheme of the five-wave field components of the first-order stress-velocity equation into the first-order stress-velocity equation.

2.4. Staggered Grid Difference Scheme for First-Order Stress-Velocity Equations. In order to avoid confusion and express each wave field quantity conveniently and intuitively, the wave field quantity \( v_x, v_z, \sigma_{xx}, \sigma_{zz} \), and \( \sigma_{xz} \) is represented by \( U, V, P, O \), and \( R \) respectively, and \( K \) represents the time node serial number. By bringing the difference scheme of the five components of the wave field into formula (10), the forward extrapolation wave field
difference scheme of the first-order stress-velocity equation is obtained as follows:

\[ U_{i,j}^{k+1/2} = U_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ \frac{1}{\Delta x} \sum_{n=1}^{N} C_n \left[ P_{i+(2n-1)/2,j}^k - P_{i-(2n-1)/2,j}^k \right] + \frac{1}{\Delta z} \sum_{n=1}^{N} C_n \left[ R_{i+(2n-1)/2,j}^k - R_{i-(2n-1)/2,j}^k \right] \right\}, \]

\[ V_{i,j}^{k+1/2} = V_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ \frac{1}{\Delta x} \sum_{n=1}^{N} C_n \left[ R_{i+(2n-1)/2,j}^k - R_{i-(2n-1)/2,j}^k \right] + \frac{1}{\Delta z} \sum_{n=1}^{N} C_n \left[ Q_{i+(2n-1)/2,j}^k - Q_{i-(2n-1)/2,j}^k \right] \right\}, \]

\[ P_{i,j}^{k+1/2} = P_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ C_1 \frac{1}{\Delta x} \sum_{n=1}^{N} C_n \left[ U_{i+(2n-1)/2,j}^k - U_{i-(2n-1)/2,j}^k \right] + C_2 \frac{1}{\Delta z} \sum_{n=1}^{N} C_n \left[ V_{i+(2n-1)/2,j}^k - V_{i-(2n-1)/2,j}^k \right] \right\}, \]

\[ Q_{i,j}^{k+1/2} = Q_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ C_3 \frac{1}{\Delta x} \sum_{n=1}^{N} C_n \left[ U_{i+(2n-1)/2,j}^k - U_{i-(2n-1)/2,j}^k \right] + C_4 \frac{1}{\Delta z} \sum_{n=1}^{N} C_n \left[ V_{i+(2n-1)/2,j}^k - V_{i-(2n-1)/2,j}^k \right] \right\}. \]

The 2N- and 2M-order difference scheme of rotating staggered grid is similar to staggered grid in time and space. The content in the previous section has been described in detail, and this part will not be repeated in this section. In this article, the differential scheme of the rotated staggered grid is directly given as:

\[ U_{i,j}^{k+1/2} = U_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ L_x^z \left( P_{i,j}^k \right) + L_z^x \left( P_{i,j}^k \right) \right\}, \]

\[ V_{i,j}^{k+1/2} = V_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ L_x^z \left( R_{i,j}^k \right) + L_z^x \left( Q_{i,j}^k \right) \right\}, \]

\[ P_{i,j}^{k+1/2} = P_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ L_x^z \left( U_{i,j}^{k+1/2} - U_{i,j}^{k-1/2} \right) + L_z^x \left( V_{i,j}^{k+1/2} - V_{i,j}^{k-1/2} \right) \right\}, \]

\[ Q_{i,j}^{k+1/2} = Q_{i,j}^{k-1/2} + \frac{\Delta t}{\rho_{i,j}} \left\{ L_x^z \left( U_{i,j}^{k+1/2} - U_{i,j}^{k-1/2} \right) + L_z^x \left( V_{i,j}^{k+1/2} - V_{i,j}^{k-1/2} \right) \right\}. \]

2.5. Finite Difference of Rotated Staggered Grid. Similar to the staggered grid in time, the stress and velocity components differ by half a time node. Different from the spatially discrete staggered grid, only partial derivatives are calculated in the direction of the coordinate axis. When the rotated staggered grid is spatially discrete, the direction of the derivation is also transformed. First, the difference between the corresponding wavefield components on the two diagonals is calculated. According to the calculation result of the diagonal line, the difference result in the direction of the coordinate axis can be obtained.

Rotating the staggered grid requires a partial derivative operation on the diagonal direction. After the diagonal result is obtained, the result of the coordinate axis direction needs to be calculated. Therefore, to use the rotating staggered grid discrete wave equation, it is necessary to establish a coordinate system parallel to the coordinate axis and a coordinate system parallel to the diagonal, which is called the old coordinate system \((x, z)\). The other set is parallel to the diagonal, which is called the new coordinate system \((x, \bar{z})\). The coordinate transformation relationship corresponding to the two coordinate systems is as follows:

\[
\begin{align*}
\bar{z} &= \frac{\Delta x}{\Delta r} x + \frac{\Delta z}{\Delta r} y, \\
\bar{x} &= \frac{\Delta x}{\Delta r} x + \frac{\Delta z}{\Delta r} y,
\end{align*}
\]

where \(\Delta x\) and \(\Delta z\) are grid spacing, \(\Delta r = \sqrt{\Delta x^2 + \Delta z^2}\), the derivation and conversion relationship of the two coordinate systems is as follows:

\[
\begin{align*}
\frac{\partial}{\partial z} &= \frac{\Delta r}{2\Delta z} \left( \frac{\partial}{\partial \bar{x}} - \frac{\partial}{\partial \bar{z}} \right), \\
\frac{\partial}{\partial \bar{x}} &= \frac{\Delta r}{2\Delta z} \left( \frac{\partial}{\partial \bar{x}} + \frac{\partial}{\partial \bar{z}} \right).
\end{align*}
\]
\begin{align*}
L_f(x^{(m)}) &= \sum_{v=1}^{N} C_v f(x^{(m)}) - f(x^{(m)}) x^{(m)} + \sum_{v=1}^{N} C_v f(x^{(m)}) - f(x^{(m)}) x^{(m)}, \\
L_g(x^{(m)}) &= \sum_{v=1}^{N} C_v f(x^{(m)}) - f(x^{(m)}) x^{(m)} + \sum_{v=1}^{N} C_v f(x^{(m)}) - f(x^{(m)}) x^{(m)}.
\end{align*}

(28)

### 3. Development Path Planning of Sports Wellness Town Based on Computer Virtual Simulation Technology

#### 3.1. System Construction

The analysis of the environmental factors of small town industry positioning and the analysis of core competitiveness belong to the qualitative analysis in the early stage, and its main structure diagram is shown in Figure 1.

The overall scheme of the sports wellness town development path planning project based on computer virtual simulation technology is shown in Figure 2. The core business functions of the project can be divided into four parts, namely smart pension, smart community affairs, business functions of the project can be divided into four parts, namely smart pension, smart community affairs, smart medical care, and smart housekeeping, and it includes a comprehensive portal website.

#### 3.2. Simulation Verification

The numerical simulation of sports wellness town development based on computer virtual simulation technology considers the following uncertain nonlinear systems:

\[ Z = \begin{bmatrix}
2z_2 - z_1 \\
-0.01z_3 - 0.05z_2
\end{bmatrix} + \begin{bmatrix}
0 \\
\cos(z_1)
\end{bmatrix} u + \Delta f(z), \quad (29)
\]

where \( Z = \begin{bmatrix}
2z_2 - z_1 \\
-0.01z_3 - 0.05z_2
\end{bmatrix} + \begin{bmatrix}
0 \\
\cos(z_1)
\end{bmatrix} u + \Delta f(z), \)

the state variable is \( z = [z_1, z_2]^T \in R^2, u \in R \) is the control input. Because of \( \theta_1, \theta_2 \in [-1, 1], f_{\text{max}}(z) = z_1^2 + z_2^2 \) is chosen to make \( \| \Delta f(z) \| \leq f_{\text{max}}(z) \). The fault parameters considered are:

\[ A(t) = \begin{cases}
0, & 0.0 \leq t < 20, \\
0.1t - 2.20 \leq t \leq 29, \\
0.9, & t > 29,
\end{cases} \quad (30)
\]

where \( A(t) = 0.9 \). The reference trajectory is defined as \( Z_1(t) = [2z_{d1} - z_{d1}, z_2, z_2]^T, Z_1(0) = [0.1, 0.1]^T. \) If \( z(0) = [0.4, 0.3]^T \) is chosen, then \( z(0) = [0.3, -0.4, 0.1, 0.1]^T. \) If \( Q = \text{diag}[60, 60] \) is chosen, then \( a = 0.006 \) and \( d = 15, \) thus guaranteeing that \( R = 0.6 \) is positive definite. In addition, the activation function is as follows:

\[ \sigma_C(Z) = [e_1, e_1, e_1, z_{d1}, e_2, z_{d2}, e_2, z_{d2}, e_2, z_{d2}, z_{d2}, z_{d2}]^T. \]

(31)

In the learning phase, the learning rate is set to \( \beta = 2.5, \) and the event-triggered mechanism parameter is \( \beta_2 = 0.1, K = 11, K = 3.2, P_2(0) = 0.1, i_d = 0.5, \theta_2 = 4. \) Due to the improved update rate of the evaluation network weights, there is no need to choose an appropriate initial value of the evaluation network weight vector to obtain an initial stable controller. Therefore, the initial weight of the evaluation network is set to 0 vector. In order to meet the requirement of continuous excitation condition, the detection noise \( n(t) = 5 \cos(7t) + 5 \cos(2t) \sin(8t)^2 \) is added in the first 20 s of the learning process.

Figure 3 shows that after a sufficient learning process, the evaluation network weight \( \bar{w} \) eventually converges to a fixed value. The tracking error trajectory of the nominal system and the dynamic event trigger conditions (57) are shown in Figures 2(a) and 2(b), respectively. It can be observed that after 20 s, the tracking error and dynamic event trigger threshold \( \| \dot{Z}_\theta \| \) can converge. Figure 4(c) depicts the convergence process of the internal dynamic signal \( P_2(t), \) showing that \( P_2(t) \) is always positive. In the whole learning process, the number of controller triggers based on dynamic event trigger conditions is 251 times, and the number of controller triggers based on static event trigger conditions is 555 times. To further illustrate the triggering efficiency of the dynamic event triggering strategy, Figure 5 compares the two triggering conditions in the time span of 5 to 10 seconds. As shown in Figures 5(a) and 5(b), the dynamic event trigger condition has a large threshold due to the positive dynamic internal signal. During this time period, the number of triggering times for the dynamic event triggering strategy is 30 times, and the number of triggering times for the static event triggering strategy is 100 times.

Therefore, adopting the dynamic event triggering strategy can reduce the number of triggers and improve the control efficiency.

Next, using the final convergence weight of the evaluation network and the dynamic event trigger condition (23), the corresponding controller \( \bar{u} \) \( (Z_k) \) can be obtained. To
verify the control performance of the proposed control strategy, \( \theta_1 = 1, \theta_2 = 1 \) is chosen and then the control strategy \( \pi^* (\tilde{Z}_k) \) is applied to the system with sampling time \( T = 0.01 \). Figure 4 shows the tracking performance, which can track the reference trajectory despite a failure at 20 s. However, due to the lack of effective fault-tolerant control methods, the tracking performance degrades. The corresponding event-triggered controller is shown in Figure 5. In addition, the value of the time-triggered guaranteed cost function is 1.9879. Since there is a positive quadratic term in formula (32), the value of the event-triggered guaranteed cost function \( V^* (Z(0)) \) will be greater than 1.9879.

Tracking trajectory of the system and control inputs of the system is shown in Figures 6 and 7.

Although the control cost increases under the event-triggered mechanism, reducing the system’s occupation of communication resources and the computer burden is the main control goal considered in this chapter. The tracking trajectory and control input of the system are shown in Figures 8 and 9, respectively.

The following nonlinear spring-mass-damper system is considered:

\[
\dot{Z} = \begin{bmatrix} z_2 \\ -0.002z_1 - 0.67z_1^3 - 0.1z_2^3 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u + \Delta f (z), \quad (32)
\]

where \( \Delta f (z) = [0, \theta_1 \cos (z_2^2)]^T \). The system state is \( z = [z_1, z_2] \in \mathbb{R}^2 \) and the control input is \( u \in \mathbb{R} \). \( f_{\max} (z) = z_1^2 \) is chosen because of \( \theta \in [-1, 1] \). The fault parameter is:

\[
\Lambda (t) = \begin{cases} 0, & 0 \leq t \leq 40, \\ 0.1t - 40, & 40 \leq t \leq 48, \\ 0.8, & t > 48. \end{cases}
\]

Then, \( \bar{\lambda}(t) = 0.8 \), and the reference trajectory is \( Z_d = [z_{d1}, z_{d2}]^T, z_d(0) = [0.1, 0.1]^T \). \( Z(0) = [3, -3, 0.1, 0.1]^T, \alpha = 0.01, R = 0.04, \zeta = 4 \) is chosen such that \( R = 1 \) is positive definite, and \( Q = \text{diag}(1, 1) \). The associated activation function is the same as in simulation one. The parameters of learning rate and leave trigger condition are chosen as \( \lambda = 2.5, \lambda = 2.5, \beta_2 = 0.3, K = 5, \kappa = 1, P_1(0) = 0.1, L_{d1} = 3, \theta_2 = 6 \). A suitable probe signal \( n(t) = 5 \sin^2 (8t) \cos (2t) + 5 \sin^4 (20t) \cos 7t \) is added to the control input for the first 8 s.

Figure 10 shows the learning process of the evaluation network based on the dynamic event-triggered strategy, and the weight of the evaluation network finally converges to a fixed value. Using the converged evaluation network weights, the fault-tolerant control input \( \pi^* (\tilde{Z}_k) \) can be obtained. Using the converged evaluation network weights, fault-tolerant control inputs can be obtained. Then, the disturbance parameter \( \theta = 0.5 \) is chosen to apply the controller \( \pi^* (\tilde{Z}_k) \). Among them, the parameter selection in formula (23) is \( \beta_1 = 0.6, K = 5, \omega = 17, P_1(0) = 0.5, L_{d1} = 0.3, \) and \( \theta_1 = 1 \), and the sampling time is \( T = 0.01 \). The simulation results are as follows: The obtained control input \( \pi^* (\tilde{Z}_k) \) can guarantee the expected tracking control performance. However, when a failure occurs, the tracking performance cannot be maintained. Figure 10 shows the controller under the dynamic event-triggered and static event-triggered strategies. Based on the dynamic event trigger
Standards for building smart communities

User

Terminals

Medical all-in-one machine
Watch or mobile phone for the elderly

Gateway

Management portal
User portal
Big data analysis portal

Application service

Wise retirement
Wise community affairs
Wise Information Technology of med
Wise housekeeping

Wise retirement
Attention and love
Daily assistance
Economic rescue

Daily care

Physical examination

Wise community affairs
Community affairs
Urban sanitation

Wise Information Technology of med
Movement data tracking
Heart rate tracking

Wise housekeeping
Housekeeping
Housekeeping management

Basic SaaS platform

Urban optical network; Wireless broadband; 4G network

Basic cloud architecture
Map engine
Data mining engine

Basic database
Message engine
Payment platform

Figure 2: Overall planning scheme of the project.

Time (sec)

-4
-2
0
2
4
6
8
10
12

0 5 10 15 20 25 30

ω1
ω2
ω3
ω4
ω5
ω6
ω7
ω8
ω9
ω10

Figure 3: Convergence process of $\hat{\omega}_c$. 
Figure 4: (a). Tracking error of nominal system. (b). Sampling error and trigger threshold of nominal system. (c). Internal dynamic signal.

Figure 5: Comparison of static event triggering and dynamic event triggering in the learning phase. (a) and (b) are sampling error and trigger threshold, respectively; (c) and (d) are sampling time and sampling interval, respectively.
mechanism, we can obtain the minimum number of triggers and the maximum average trigger interval, thus reflecting better control efficiency.

On the basis of the above research, the effect of the development path planning method of sports wellness town based on computer virtual reality technology proposed in this article is evaluated, the results of the development path planning of sports wellness town are calculated, and the results shown in Table 1 and Figure 11 are obtained.

From the above research, it can be seen that the development path planning method of sports wellness town based on computer virtual reality technology proposed in this article has a good effect and can effectively promote the progress and development of sports wellness town.
4. Conclusion

The exploration of the “wellness based on the integration of sports and tourism” is a new growth point for the economic development of the sports industry. In the integration model of sports and related industries, the industrial extension and integration of sports and tourism industry, and the industrial extension and integration of sports and elderly care service industry and health service industry are extremely important sectors. The exploration and development of the “wellness based on the integration of sports and tourism” model is undoubtedly a new growth point to promote the economic development of the sports industry. Moreover, it can also promote the employment of a large number of talents in related industries, increase sports consumption, and promote the diversified development of leisure towns with sports characteristics. This article combines computer virtual technology to analyze the development path planning of the sports wellness town and conducts a research on the effect of the development path planning of the sports wellness town through simulation research. The simulation results show that the development path planning method of sports wellness town based on computer virtual reality technology proposed in this article has a good effect and can effectively promote the progress and development of sports wellness town.

Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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