[0010] The present invention also provides a software for performing the above-mentioned method for generating an adjusted distance of a sleep respiratory tract.

[0011] The present invention further provides an apparatus system storing internally the above-mentioned software, wherein the apparatus system is used to perform the software.

[0012] The present invention also further provides a computer readable recording medium that records a program for causing a computer to execute the above-mentioned software when the program is loaded by the computer.

[0013] With the implementation of the present invention, at least the following progressive effects can be achieved:

1. The manufacturing process is simple without using additional complex instruments, and it can save the cost of arrangement and using;
2. The correct respiratory tract model of patients can be obtained directly without performing trial and error of experiment;
3. It is easy to verify or confirm, and it can significantly reduce errors in adjusting the sleep respiratory brace and save expenses and time costs;
4. The accurate corrective expansion distance of the sleep respiratory brace can be obtained; and
5. The present invention can provide for doctors as a reference in the lower jaw corrective surgery.

[0014] In order that the technology contents of the present invention will be readily understood and implemented by those skilled in the relevant art, and related objects and advantages of the present invention may be readily understood by those skilled in the relevant art according to the disclosure, scope of the appended claims and accompanying drawings of the description, the detailed features and advantages of the present invention will be described in detail in the embodiments. The foregoing description is merely a general description of the technical solution of the present invention. In order to better understand the technical

hypopharynx R40, and a trachea R50. In embodiments of the present invention, the described respiratory tract refers to all parts from the velopharynx R20, the oropharynx R30, the hypopharynx R40 to the trachea R50.

[0017] In reference to FIG. 1B, an embodiment of the present invention provides a method S100 for generating an adjusted distance of a sleep respiratory tract, which may be executed in a computer system. The method S100 for generating an adjusted distance of a sleep respiratory tract includes the steps of: reading a first medical image (step S10); establishing a first respiratory tract model (step S20); performing a first breath simulation (step S30); reading a second medical image (step S40); establishing a second respiratory tract model (step S50); performing a second breath simulation (step S60); and calculating an adjusted distance (step S70).

[0018] As shown in FIG. 1B, the step S10 of reading the first medical image is reading a first respiratory tract tomography of a patient by a computation module. The first respiratory tract tomography can be images of computed tomography (CT) or cone beam computed tomography (CBCT).

[0019] In order to read the first respiratory tract tomography, the images can be read by the computation module directly by being connected to medical CT or CBCT device in a wireless or wired manner. The computation module can also read the image data stored in advance and generated by the CT or CBCT device to obtain the first respiratory tract tomography.

[0020] The computation module used herein can be a computer system, a microprocessor system, a personal computer, a notebook computer, or an intelligent device comprising at least one computation or application software.

[0021] As shown in FIGs. 1B and 2, the step S20 of establishing a first respiratory tract model is establishing the first respiratory tract model corresponding to the patient's respiratory tract by the computation module according to the first respiratory tract

comparing gray level or values, and thus to establish the second respiratory tract model of the respiratory tract of the patient.

[0032] As shown in FIG. 7, after FIGs. 2 and 5 are overlapped, it can be clearly observed that comparing with the respiratory tract of the first respiratory tract tomography, the respiratory tract of the second respiratory tract tomography expands a spatial volume to a level.

[0033] Also as shown in FIG. 1B, the step S60 of performing a second breath simulation is performing the breath simulation by the computation module according to the second respiratory tract model, and data of a second respiratory pressure distribution, a second magnitude of a pressure differential and a second jet expansion angle, and associated data information about breath state when the occlusal structure is bitten by the patient are obtained.

[0034] Also as shown in FIGs. 8A and 8B, the scale index of pressure in figures is from -200 to 200 and the unit of pressure P is Pa (N/m^2). From the front view and side view of simulation results of the respiratory tract, we can learn that, when a subject has accepted the correction after wearing the adjustable occlusal splint 10, the second vertical reference distance between the upper jaw and the lower jaw is D2, and the second vertical reference distance D2 is greater than the first vertical reference distance D1. At this point, since the upper respiratory tract is expanded due to outward move of the lower jaw, the simulation in the upper respiratory tract shows the light state, which indicates an even pressure distribution in the respiratory tract and a reduced and similar pressure.

[0035] As shown in FIG. 9, after the simulation of the second jet expansion angle of the respiratory tract is performed, we can learn that with the correction, the respiratory tract shows a smaller jet expansion angle with $\theta_2=4.2^\circ$, and has similar width.

[0036] In reference to FIG. 1B, the step S70 of calculating an adjusted distance is calculating a corrective expansion distance by the computation module according to the data

of the first respiratory pressure distribution, the first magnitude of the pressure differential, the first jet expansion angle, the second respiratory pressure distribution, the second magnitude of the pressure differential, and the second jet expansion angle, wherein the corrective expansion distance is the adjusted distance.

[0037] The corrective expansion distance can be obtained by calculating the data of the first respiratory pressure distribution, the first magnitude of the pressure differential, the first jet expansion angle, the second respiratory pressure distribution, the second magnitude of the pressure differential, and the second jet expansion angle by the computation module using interpolation method, heterodyne method, average calculation method, or database comparison-bioinformatics.

[0038] Next, in reference to FIG. 1B again, the step S80 of adjusting a sleep respiratory brace is adjusting the sleep respiratory brace of the patient according to the obtained corrective expansion distance by calculating with the computation module.

[0039] The embodiment can further include the step S80 of adjusting the sleep respiratory brace, wherein the sleep respiratory brace is adjusted by using the above-mentioned corrective expansion distance, and the lower jaw part of the sleep respiratory brace is advanced or expanded, which can be done manually or by an adjusting device.

[0040] Furthermore, if the patient is assessed to be suitable for orthodontic surgery, the corrective expansion distance can be provided to the surgeon to use as a reference during the surgical procedure to determine how far the surgeon should advance or extend the lower jaw of the patient. Thus, the success rate of surgery can be improved more accurately.

[0041] In this way, with the implementation of the method S100 for generating the adjusted distance of the sleep respiratory tract, since the patient can wear a sleep respiratory brace which is accurately adjusted or the doctor can master the advanced or expanded distance of the lower jaw, the respiration and sleep will not be interfered by improper position

2. The method of claim 1, wherein the first respiratory tract tomography and the second respiratory tract tomography are the images of computed tomography.

3. The method of claim 1, wherein the first respiratory tract tomography and the second respiratory tract tomography are the images of cone beam computed tomography.

4. The method of claim 1, wherein the step of establishing the first respiratory tract model is establishing a three-dimensional respiratory tract model of the patient.

5. The method of claim 1, wherein the step of establishing the second respiratory tract model is establishing a three-dimensional respiratory tract model of the patient.

6. The method of claim 1, wherein the corrective expansion distance is obtained by calculating with the computation module using interpolation method, heterodyne method, average calculation method, or database comparison-bioinformatics.

7. The method of claim 1, wherein the computation module is a computer system, a microprocessor system, a personal computer, a notebook computer, or an intelligent device comprising at least one computation or application software.

8. The method of claim 1, further comprising a step of adjusting a sleep respiratory brace, wherein a lower jaw part of the sleep respiratory brace is advanced or expanded according to the corrective expansion distance.

9. The method of claim 1, wherein the occlusal structure is a brace, an occlusal splint, an adjustable brace, or an adjustable occlusal splint.

10. The method of claim 8, wherein the step of adjusting the sleep respiratory brace is performed by an adjusting device.

11. A software for performing a method for generating an adjusted distance of a sleep respiratory tract of any of claims 1 to 6.

12. An apparatus system internally storing a software of claim 11, wherein the apparatus system is used to perform the software.

13. A computer readable recording medium that records a program for causing a computer