$$GDOP = \sqrt{(G^T G)^{-1}} \qquad (20)$$

According to the previously cited theorem from Ref.[4], we can easy to know that $\mathrm{GDOP} \geq \sqrt{2}$ for four-receiver GDOP bound.

3.2. Discussion for positioning accuracy

Suppose that the positioning range is the $30\mathrm{m} \times 20\mathrm{m} \times 3.5\mathrm{m}$ space. Receiver stations arrangement is illustrated in Fig.2. We known, GDOP expresses easiness of geometrical effect of receivers arrangement on the error. There is the higher GDOP value, the higher probability that the geometrical arrangement influences the positioning accuracy. Based on Eq.20, we can obtained the GDOP is between 2 and 5.It is assumed that there are not multi-path and fading.

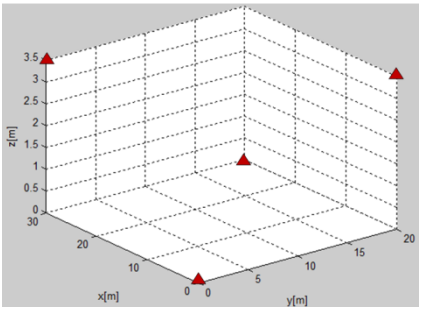

Fig.2 arrangenments of receivers

In doors, we neglect the troposphere and ionosphere error, location error of ITPS is given by:

$\sigma = \sqrt{\sigma_{\mathrm{clock}}^2 + \sigma_{\mathrm{phase}}^2}$, σ_{clock} is receiver crystal error, we supposed it frequency is 10-10Hz, thus $\sigma_{\mathrm{clock}} = 0.03\mathrm{m}$. σ_{phase} is carrier phase error, if we can obtain 1o precision, then $\sigma_{\mathrm{phase}} = 5.55 \times 10^{-4}\,\mathrm{m}$.

$\sigma = \sqrt{0.03^2 + (5.55 \times 10^{-4})^2} \approx 0.03\mathrm{m}$.

Then positioning error is about from 6cm to 15cm.

4. Conclusion

A study on carrier phase observation principle of the indoor inverse transmitting positioning system proposed. We rigorously derived carrier phase observation equation. Because of indoors, the value of GDOP influence on positioning accuracy deeply, so in order to analyze the ITPS positioning accuracy, we also induced the formula GDOP using double difference method. Last, we discussed the positioning accuracy on condition that not to think multi-path and fading. Future works are hardware experiments using the determined scheme.

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