A Design of Double Timing Pulse Interpolation Counter   
and its Test Device

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According to the ISO 7278-3:1998 standard, the double-timing pulse interpolation principle is discussed, the relevant formulas are derived. Based on the pulse interpolation principle, and the FPGA EP2C5T144C8 of Altera Cyclone II series as a core, a counter with pulse interpolation function, which is used especially for flow calibration facilities is designed. The experimental results show that the resolution of the counter can reach 0.01% even if a few of the cumulative number of pulses are gathered. The timing accuracy of the counter is better than 0.01ms. The experiments on the Bell prover gas flow standard facility show that in a relatively short calibration time and collected few accumulated pulse, the accuracy of the counter improves more than one order of magnitude than the traditional method. moreover，a Calibration device of pulse interpolation counter (equipment) is designed with FPGA. The device is composed of a controller, a standard signal generator and a computer. The device can calibrate the counting accuracy or uncertainty of the pulse interpolation equipment, and the accuracy of the response of a counter for a given frequency range and frequency change rate. The paper also describes the method of synchronous testing in the flow standard device facilities. Some experimental results are given.