Real time online calibration of differential reflectivity (ZDR) is an important part in the upgrade of operational China New Generation Weather Radar with dual-polarization capability. First of all, the principles of ZDR calibration methods using external instrument, internal test signal, sun and drizzle are introduced respectively in the paper. And then key factors that affect ZDR measurement accuracy are analyzed, which include drifting biases induced by transmitter, receiver and azimuth rotary joint. In addition, advantages and disadvantages of various calibration methods are compared. Moreover, calibration methods adopted by operational WSR-88D in the USA and domestic dual-polarization weather radar in China are introduced. What’s more, taking the C-band dual-polarization radar operated by Nanjing University as example, ZDR calibration results by using external instrument, sun and drizzle are presented and analyzed. In consequence, it is found that calibration results from external instrument and drizzle have good consistency, whose ZDR measurement difference is only 0.06dB; furthermore, after taking ZDR bias caused by transmitter chain and transmitted feedline loss into account, calibration result from the sun is nearly the same as that from external instrument. Besides, it is also shown in the observation that ZDR measurement result changes with azimuth regularly. Therefore, with the long term operation of dual-polarization weather radar, the effect of azimuth rotary joint should not be neglected. This paper has a certain reference value for the operation and network observation of the dual polarization radar in China in future.