

This paper presents a new phase current-balance control method of unbalanced phase currents in multiphase converters. The phase current reconstruction process, in which the sampled dc-link current from a dc-link current sensor is used to reconstruct the phase currents, is comprehensively investigated, taking account of both the region of duty ratio and the operating mode of the continuous current mode (CCM) and discontinuous current mode (DCM). DCM operation reveals that the phase current reconstruction cannot coincide with the average value of the respective phase current. Eventually, it is confirmed that this proposed balance control based on a circular chain control makes it possible to establish an exact current sharing among the phase currents all over the operating condition including the DCM. The actual phase currents do not show any distorted waveforms due to the multisamplings of dc-link current that do not provoke any extra switching of the converter switches at all. The validity and effectiveness of the proposed phase current-balance control are illustrated through the experimental results.