



Polarity imbalance and quadrupole moment of the photospheric magnetic field

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Polarity imbalance of the photospheric magnetic field was studied using synoptic maps of the NSO Kitt Peak (1976 – 2016). Imbalance of positive and negative fluxes was considered for the fields with strength $B > 50$ G in the sunspot zone ($5^\circ - 40^\circ$) and for the fields with strength $B < 50$ G at higher latitudes ($40^\circ - 90^\circ$). The 22-year periodicity in the imbalance of positive and negative fields was found which maintained itself during four solar cycles. For the sunspot zone the sign of the imbalance always coincides with the northern hemisphere polarity. For the high latitudes the sign of the imbalance always coincides with the southern hemisphere polarity. The connection of the imbalance with the quadrupole moment (g_{20}) of the potential field source surface (PFSS) model was observed. The signs of polarity imbalance of the high and low latitudes develop in antiphase, showing good correlation with the quadrupole moment (g_{20}) or its reversed value ($-g_{20}$) correspondingly.