Fig. 7.9 Instantaneous amplitude and phase of sunspot series at $f_0 = 1/11$ cycles per year (two passes of 11-term simple moving average filter).

Figures 7.8 and 7.9 give information about variations in the fundamental frequency of the sunspot oscillations. The analysis of Section 6.5 suggests that the *instantaneous relative phase* of the second harmonic might be useful in exploring the nonsinusoidal nature of the oscillations. This is the instantaneous analog of the relative phase discussed in Section 6.5 and is constructed by demodulating at frequency $2f_0$ in addition to f_0. Figure 7.10 shows the results for the two filters used previously. In each panel the quantity graphed is $\phi_t(2f_0) - 2\phi_t(f_0)$, where $\phi_t(f_0)$ and $\phi_t(2f_0)$ denote instantaneous phase obtained from demodulation at frequencies f_0 and $2f_0$ cycles per year, respectively. Where the principal