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Atmospheric Measurement Techniques Discussions

Interactive comment on "The response of super pressure balloons to gravity wave motions" *by* R. A. Vincent and A. Hertzog

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In response to the request for more information on the numerically computed SPB response, we have extended the discussion of how the numerical results were computed, as shown in the second paragraph of section 3.1. We believe that this extension should give an interested reader sufficient information to reproduce our results without significantly lengthening the paper. The revised second and third paragraphs of section 3.1 are shown below, the additional text shown in bold font. The added reference is to Press et al., (1992), Numerical Recipes in C: The art of scientific computing, Cambridge University Press

Figure 1**a** shows the result of numerically solving Eq. 2 using a fourth order Runge-Kutta method **(Press et al., 1992). For this example the total duration of the time series was 12.5 hr (i.e. 50 oscillations) and a time step of 1 sec (0.1% of the period) was used, although the results are not particularly sensitive to the time step. Transients due to the initial conditions persisted for less than a cycle, so the results shown in Figure 1a are the steady-state response.** The red line represents the vertical position of the balloon plotted against time. The blue line represents the balloon displacement derived using an analytic method described below.

While the numerical solution is almost sinusoidal it is noticeable that higher frequency components are also present. The power spectral analysis **of the whole 12.5 hr period and** shown in Figure 1**b** illustrates the absence of even harmonics and the dominance of the first harmonic over the other odd harmonics. The third harmonic is approximately ten percent in magnitude of the first harmonic and the fifth harmonic less than five percent. Higher harmonics are less than one percent of the first harmonic. This result supports the analysis of Nastrom (1980) that shows that only odd harmonics are present in the vertical displacement, with the first harmonic dominating.

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