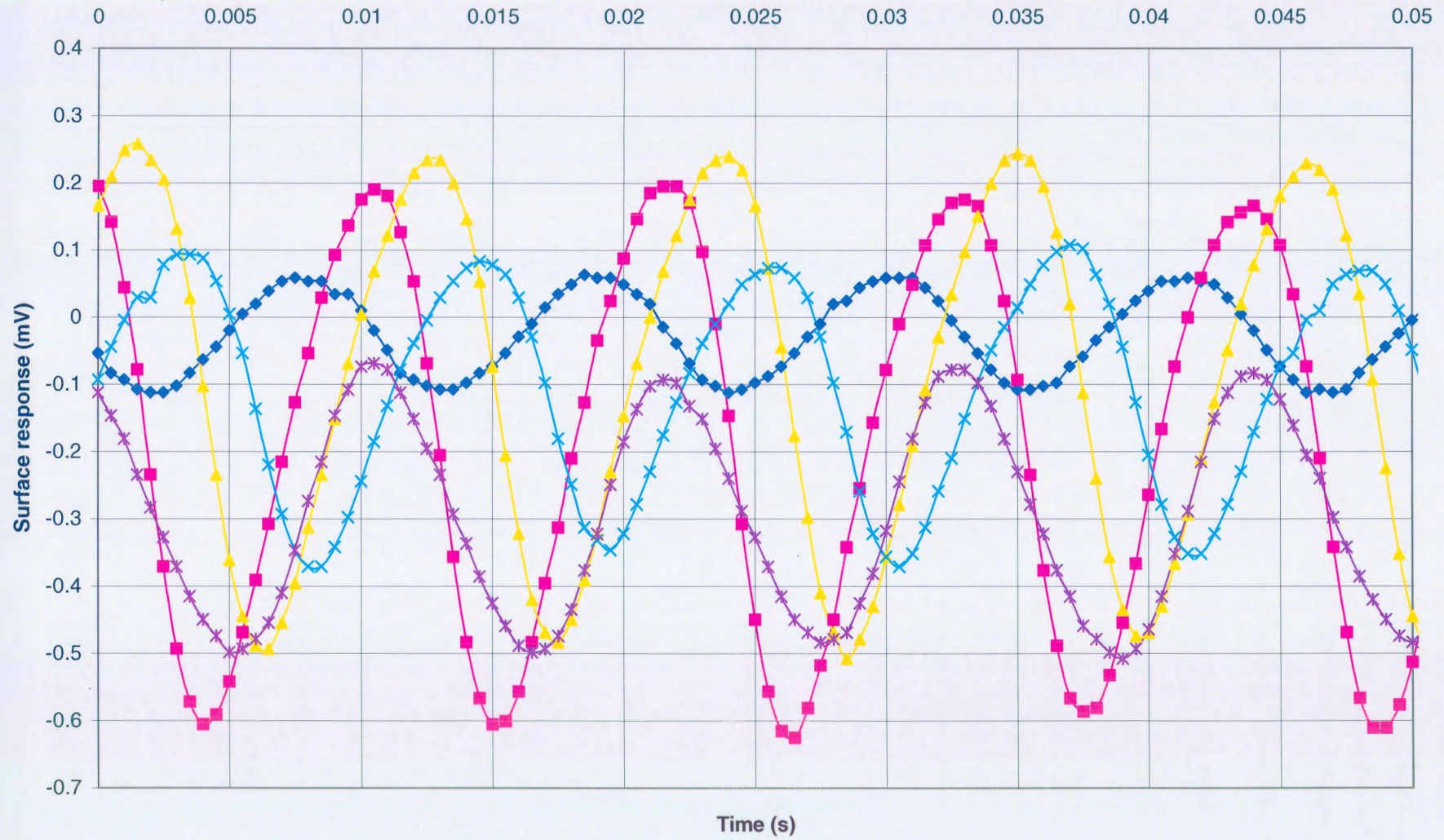




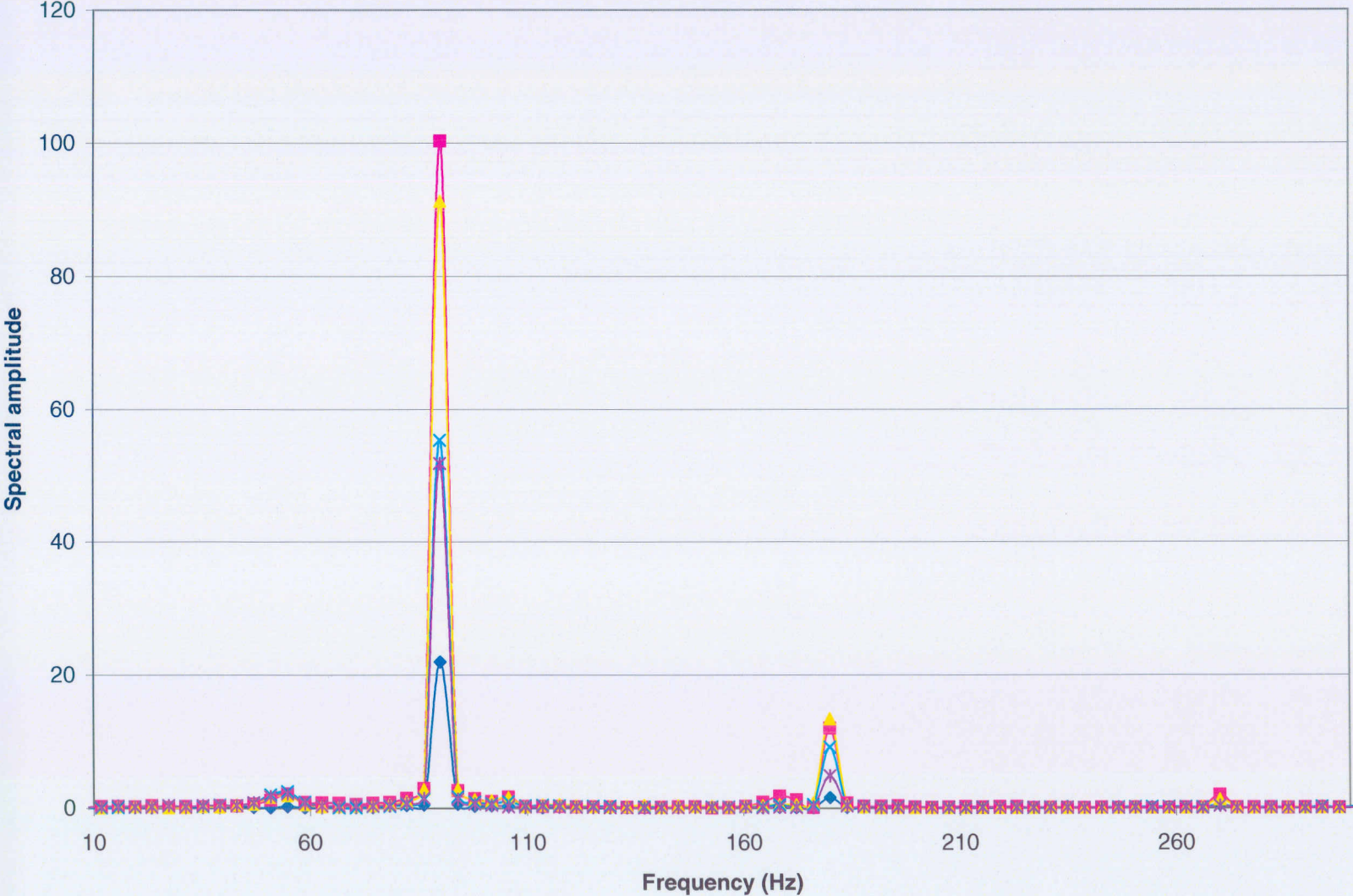
## **Appendix A**

### **Example of CSW test for one frequency**

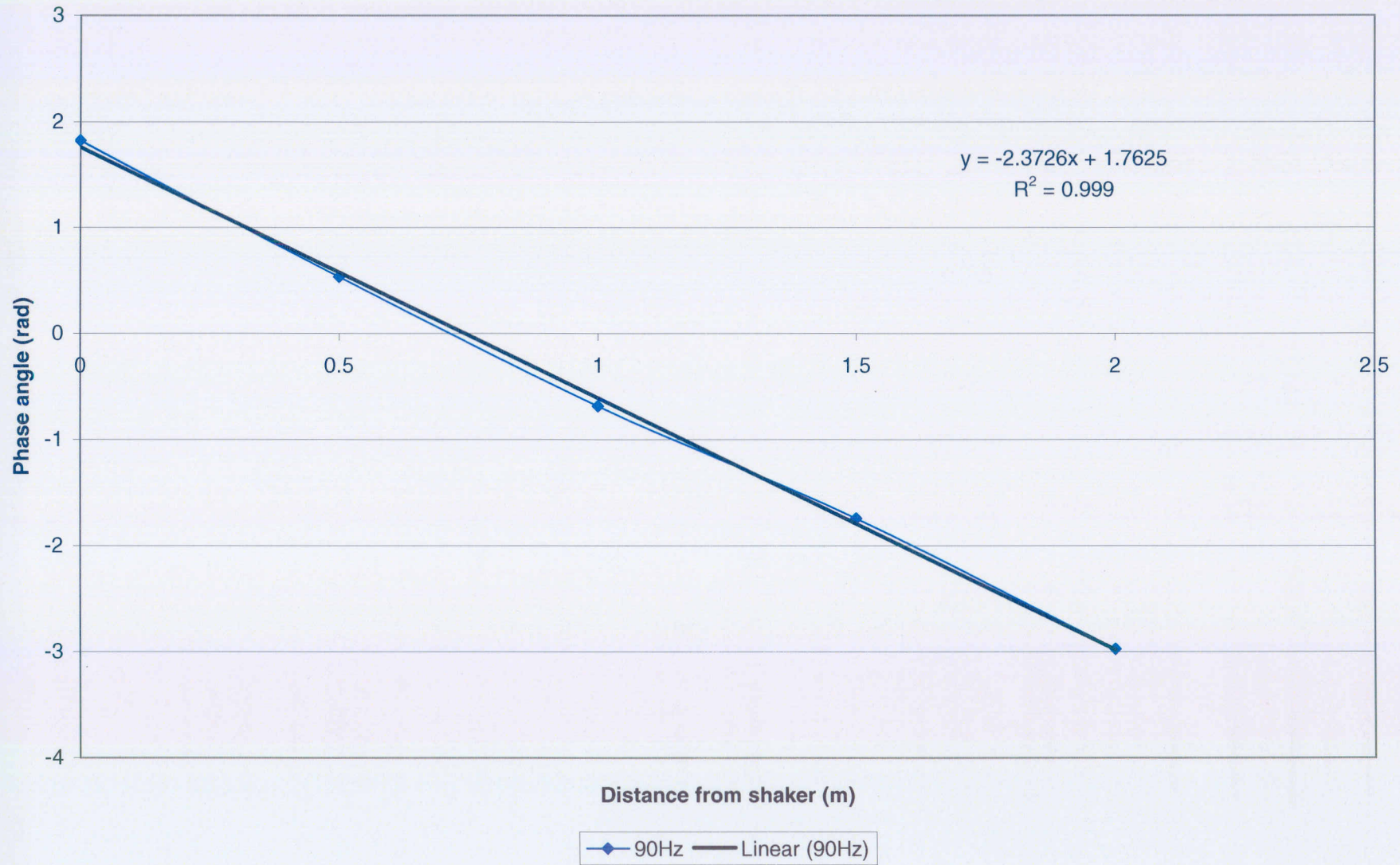
### Time domain



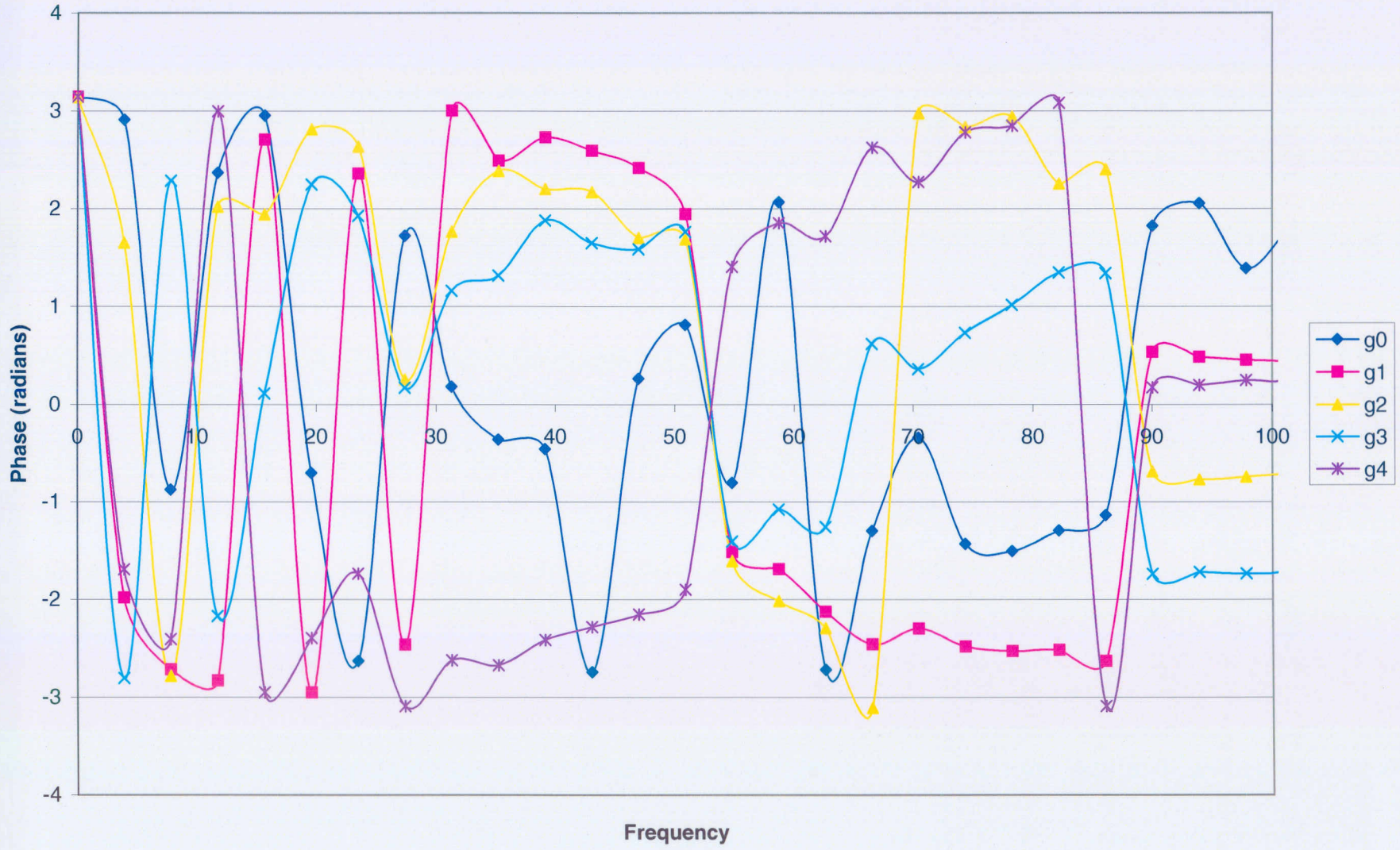
Frequency Spectrum (90 Hz)



Phase plot



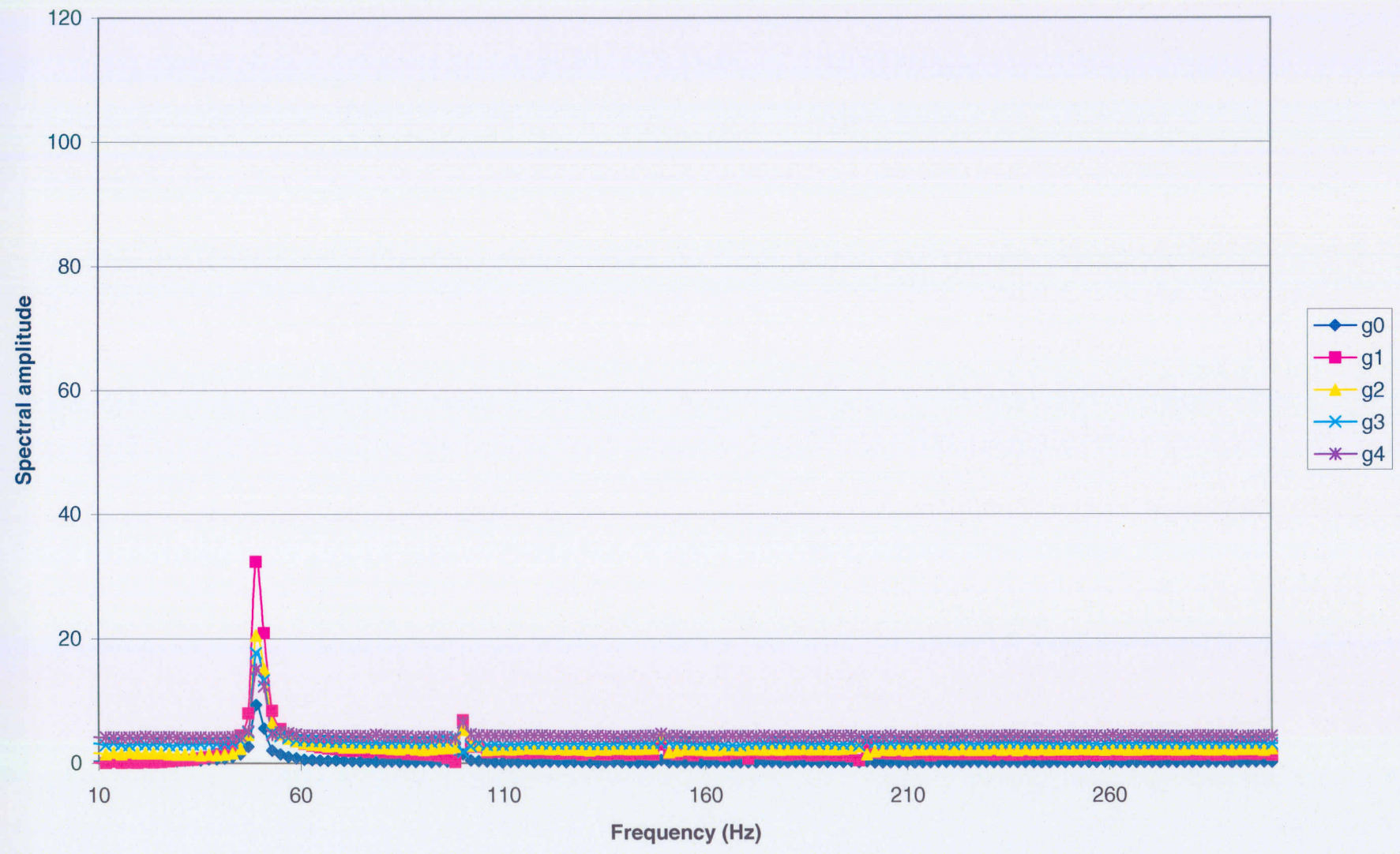
# Phase



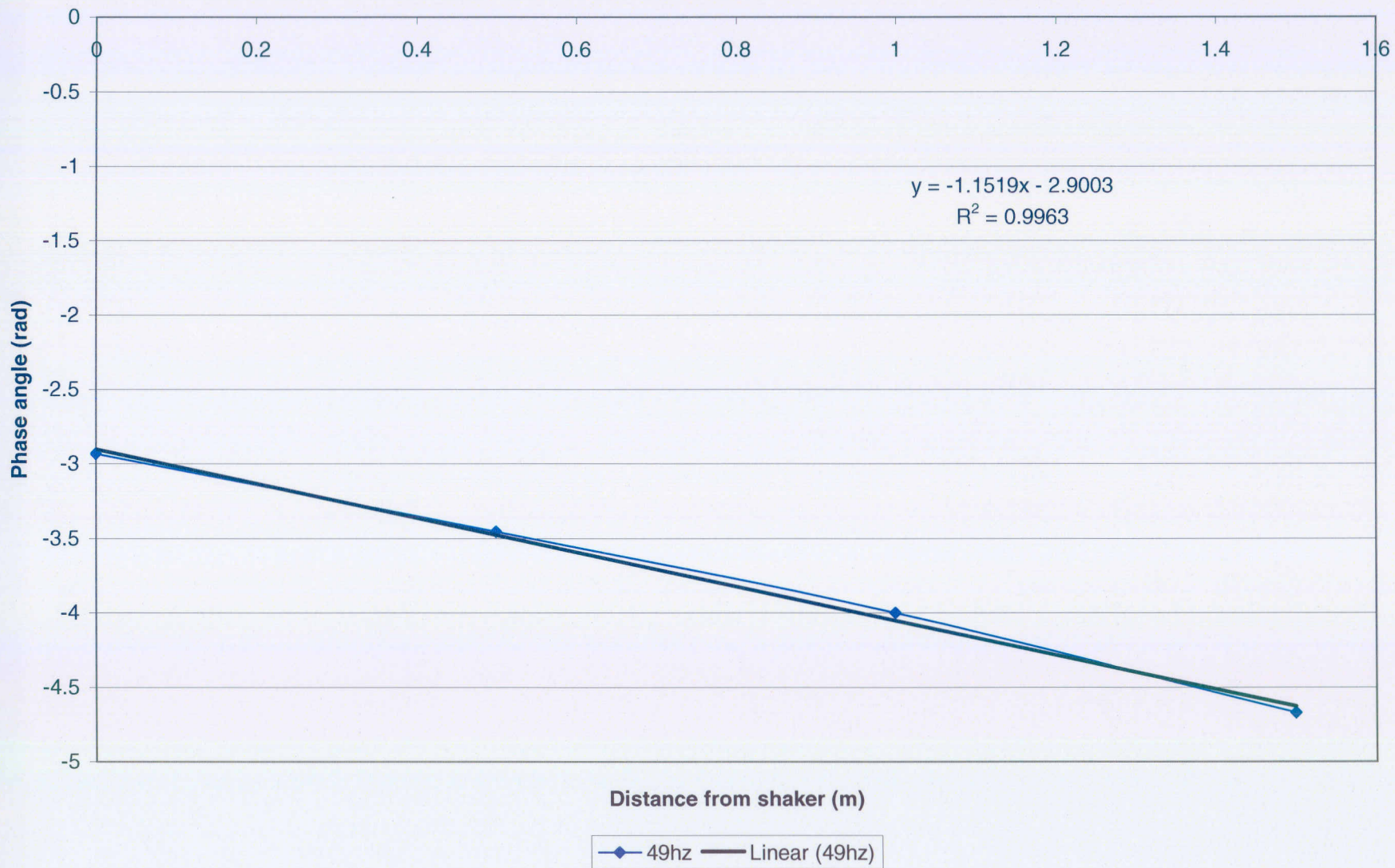


**Appendix B**  
**Phase plots and frequency spectrum for the in situ CSW**  
**testing**

Frequency Spectrum (49 Hz)

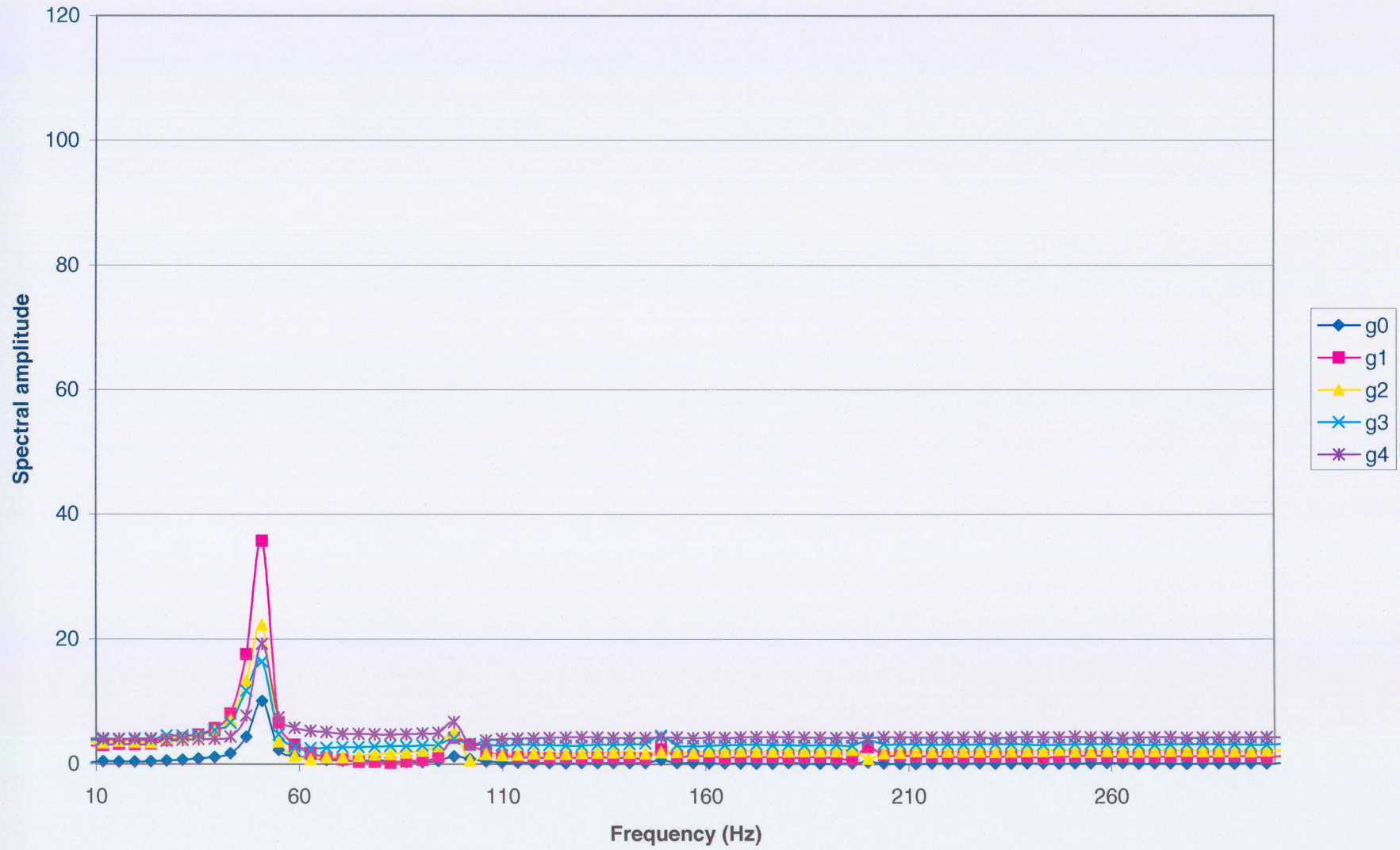


Phase plot

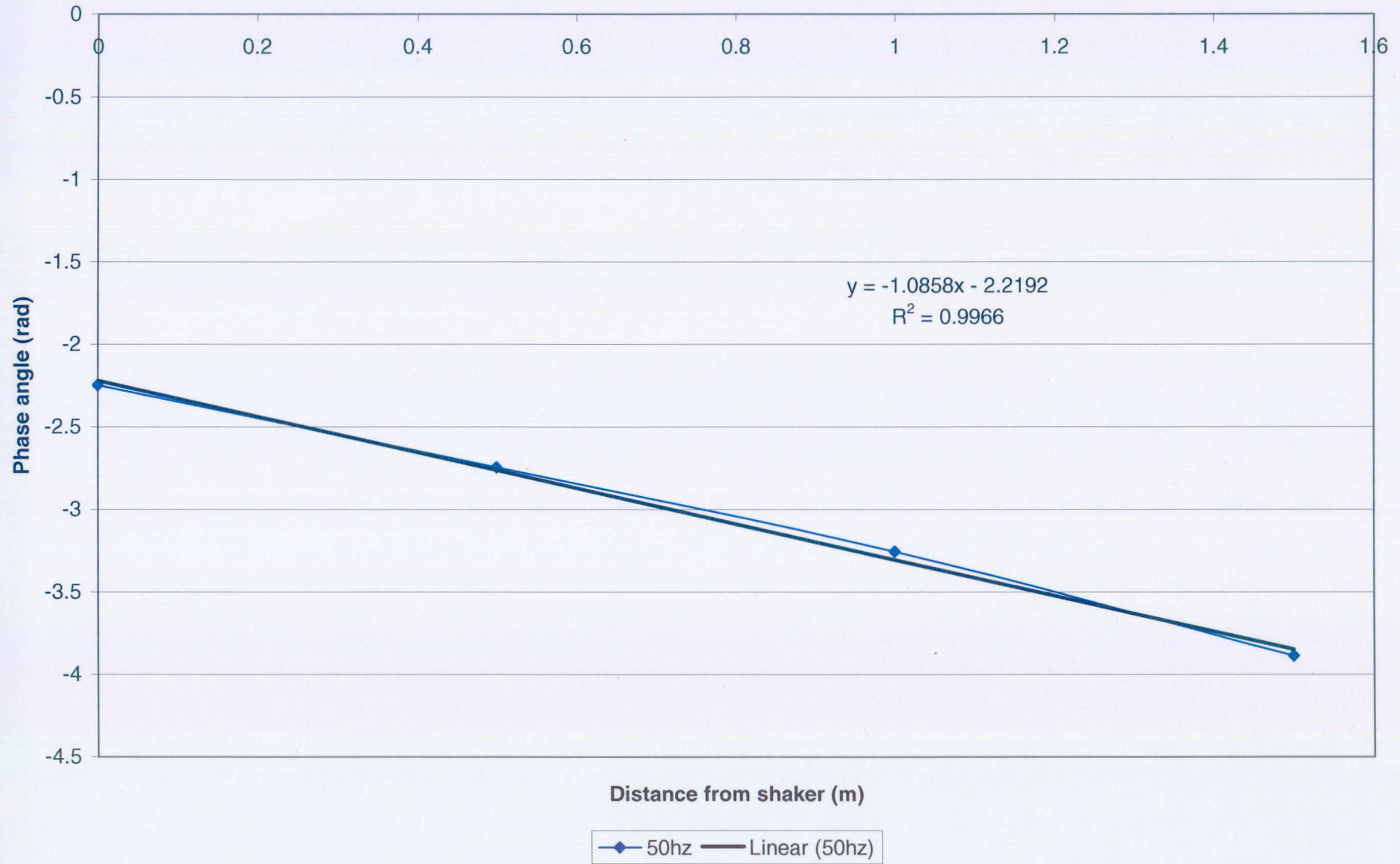




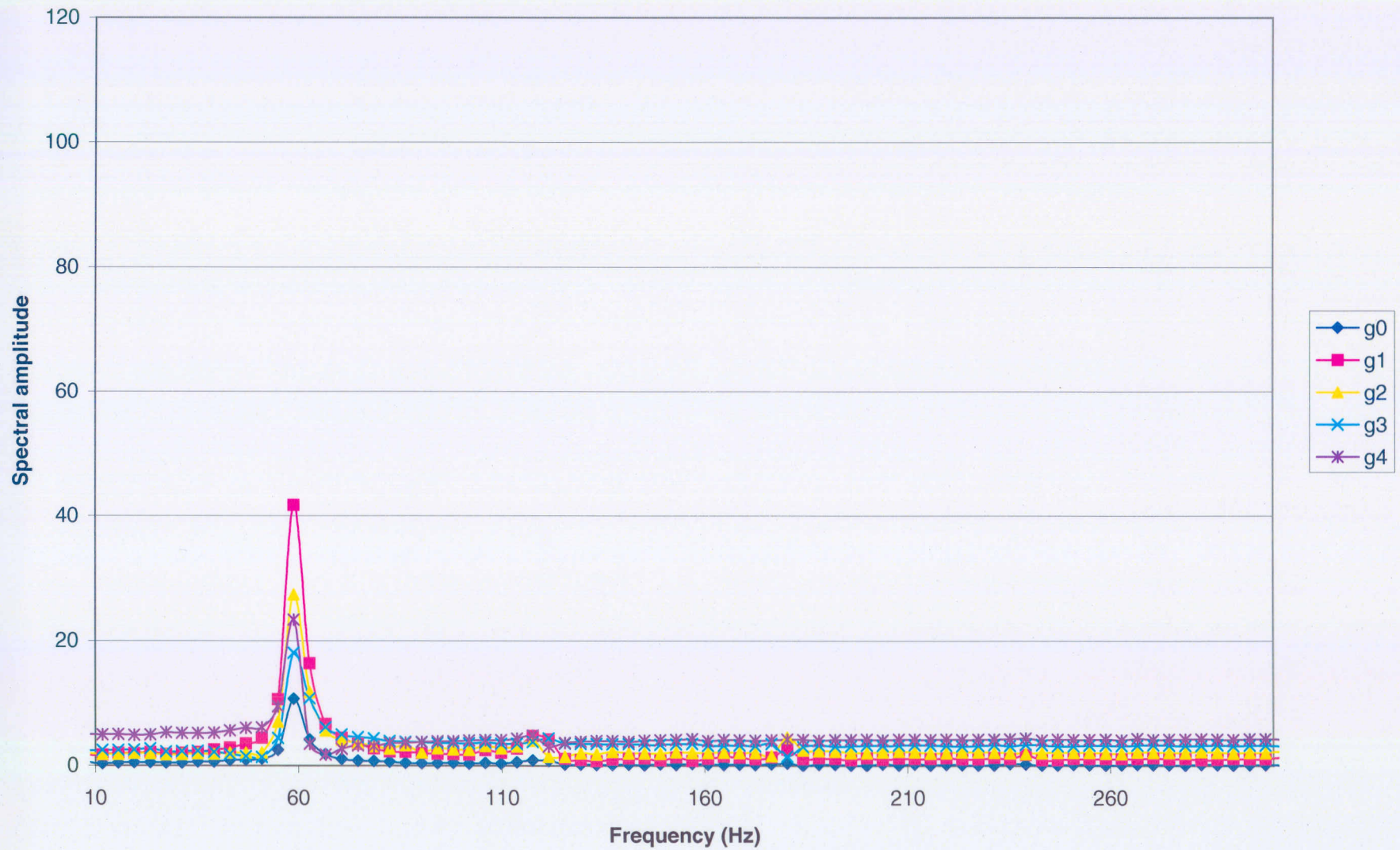
Frequency Spectrum (50 Hz)



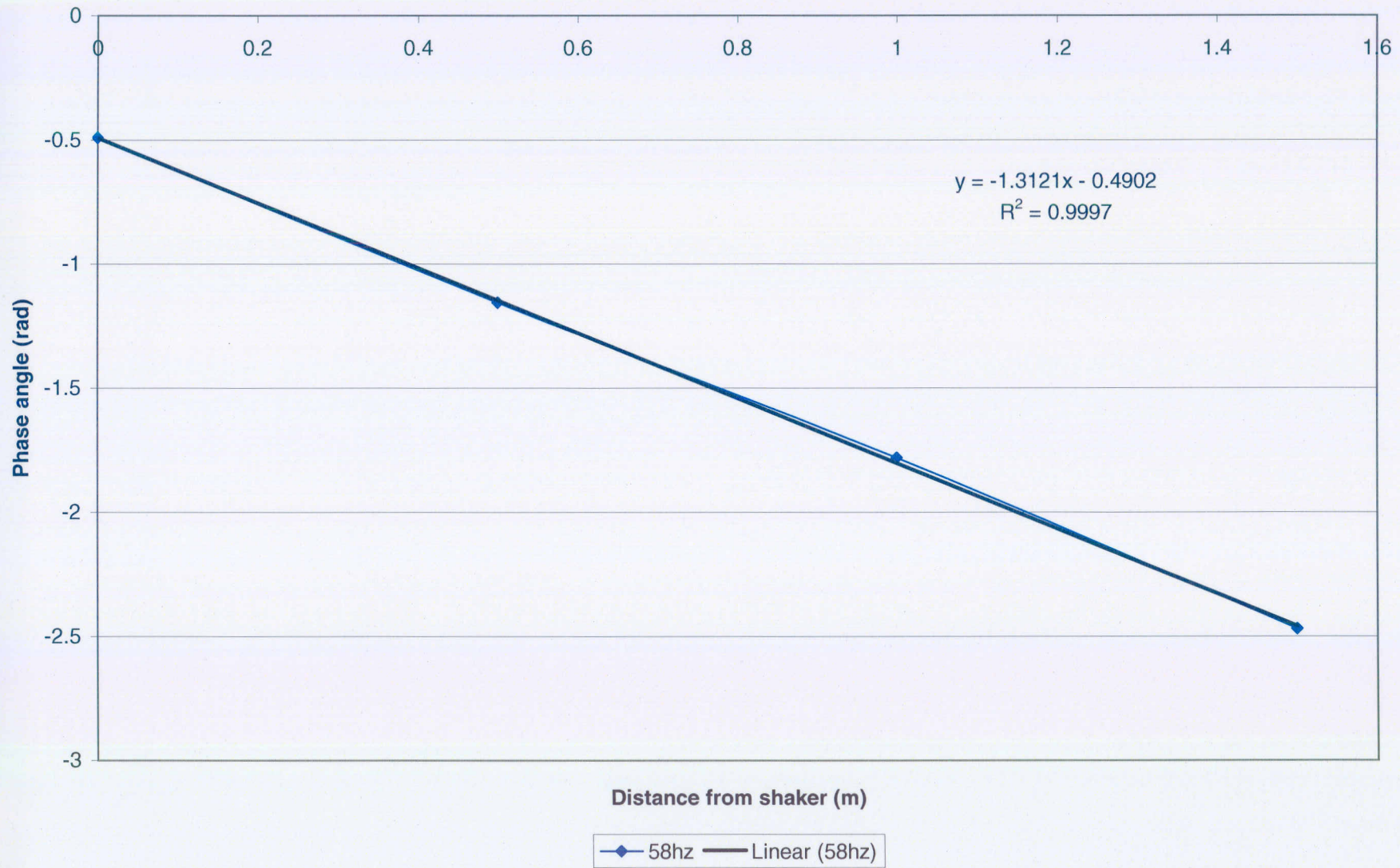
Phase plot



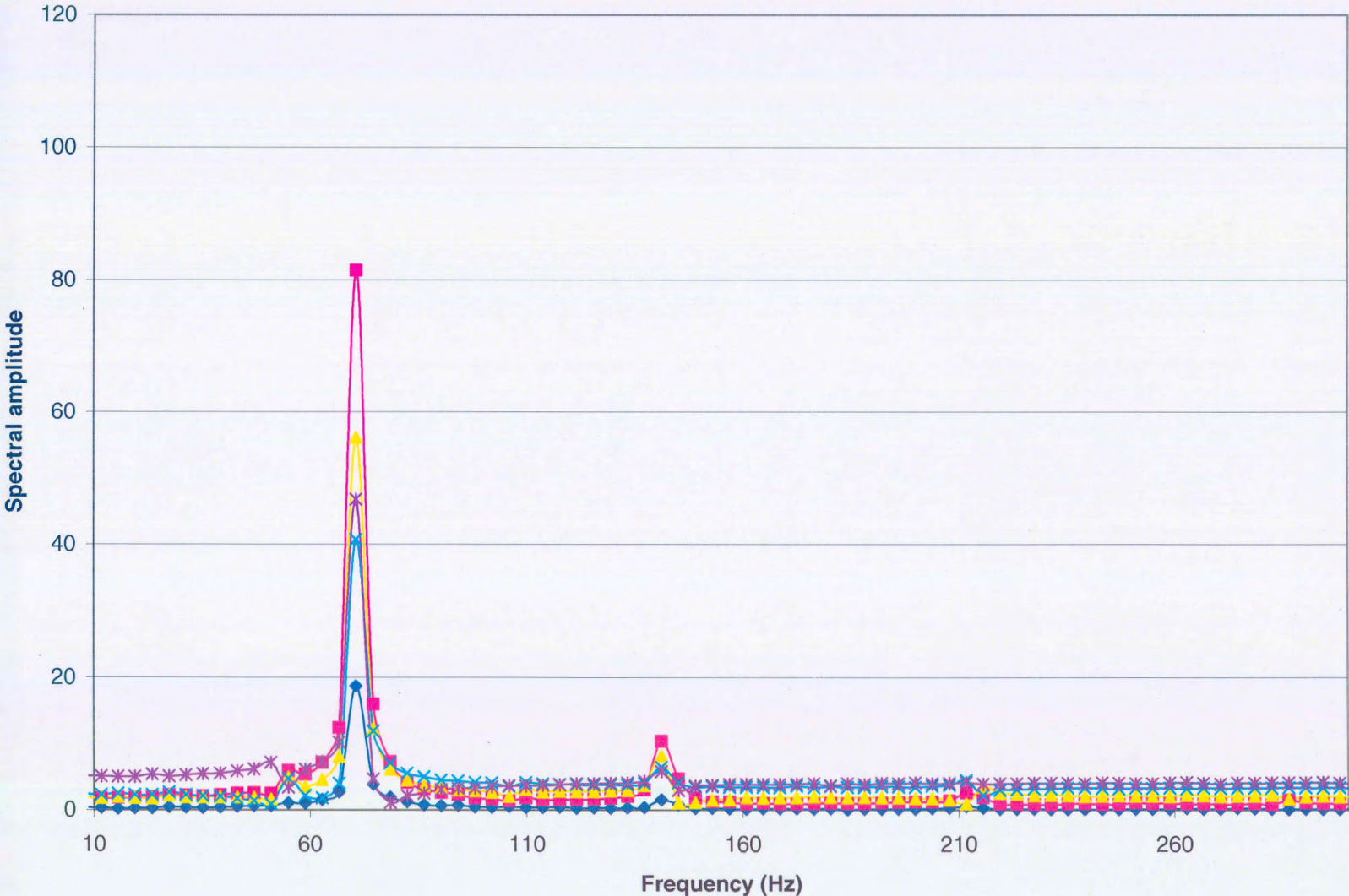
### Frequency Spectrum (58 Hz)



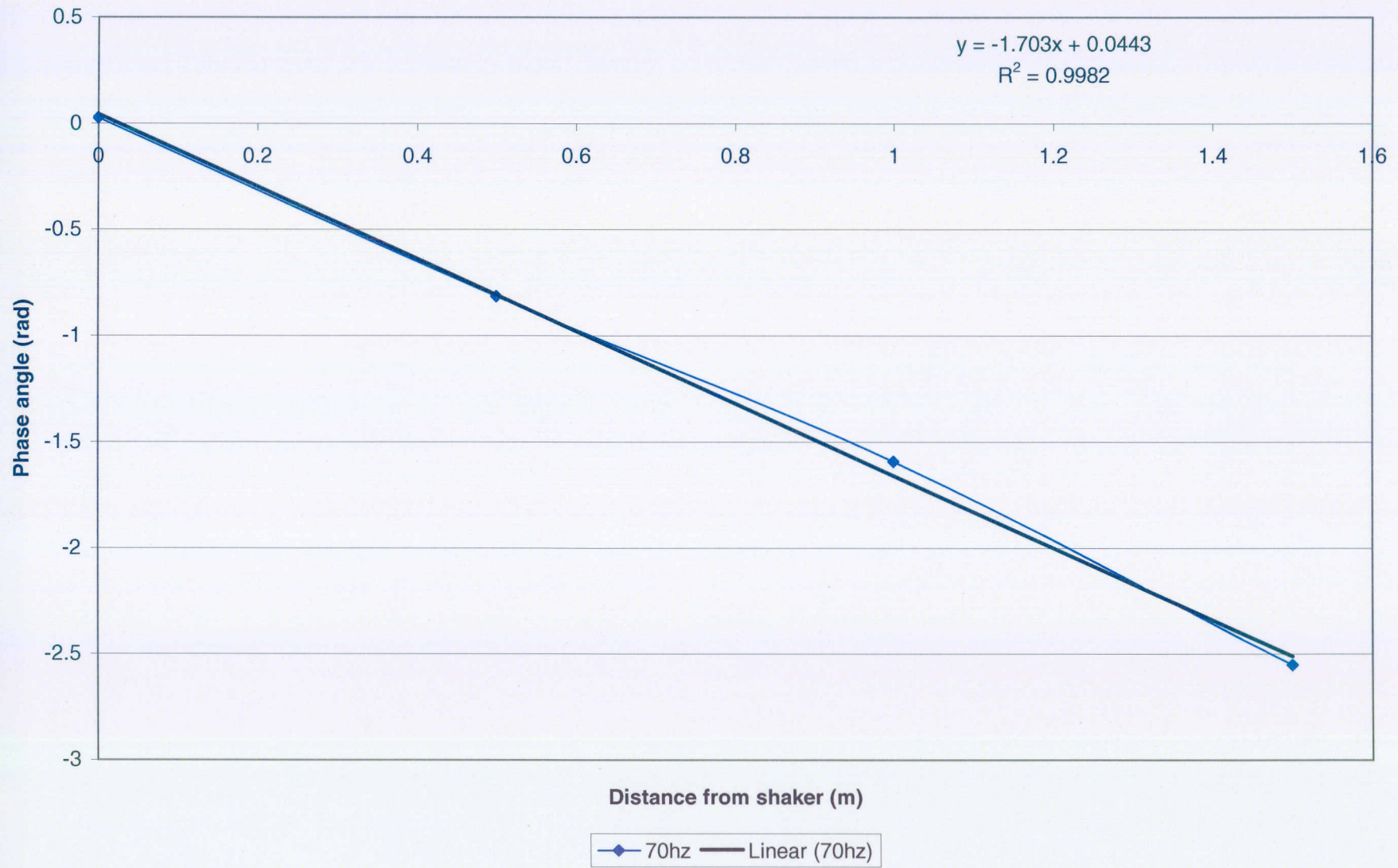
Phase plot



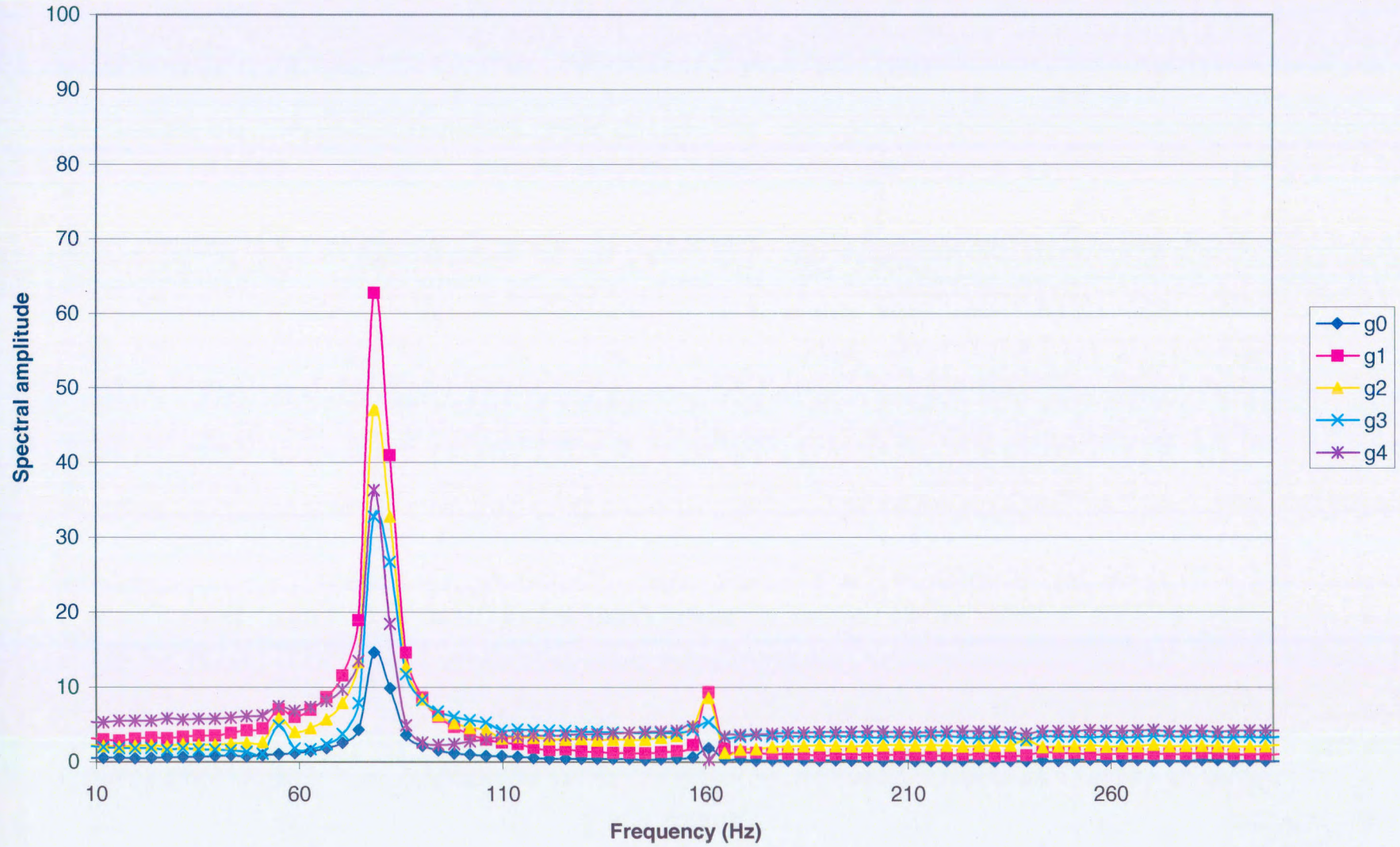
Frequency Spectrum (70 Hz)



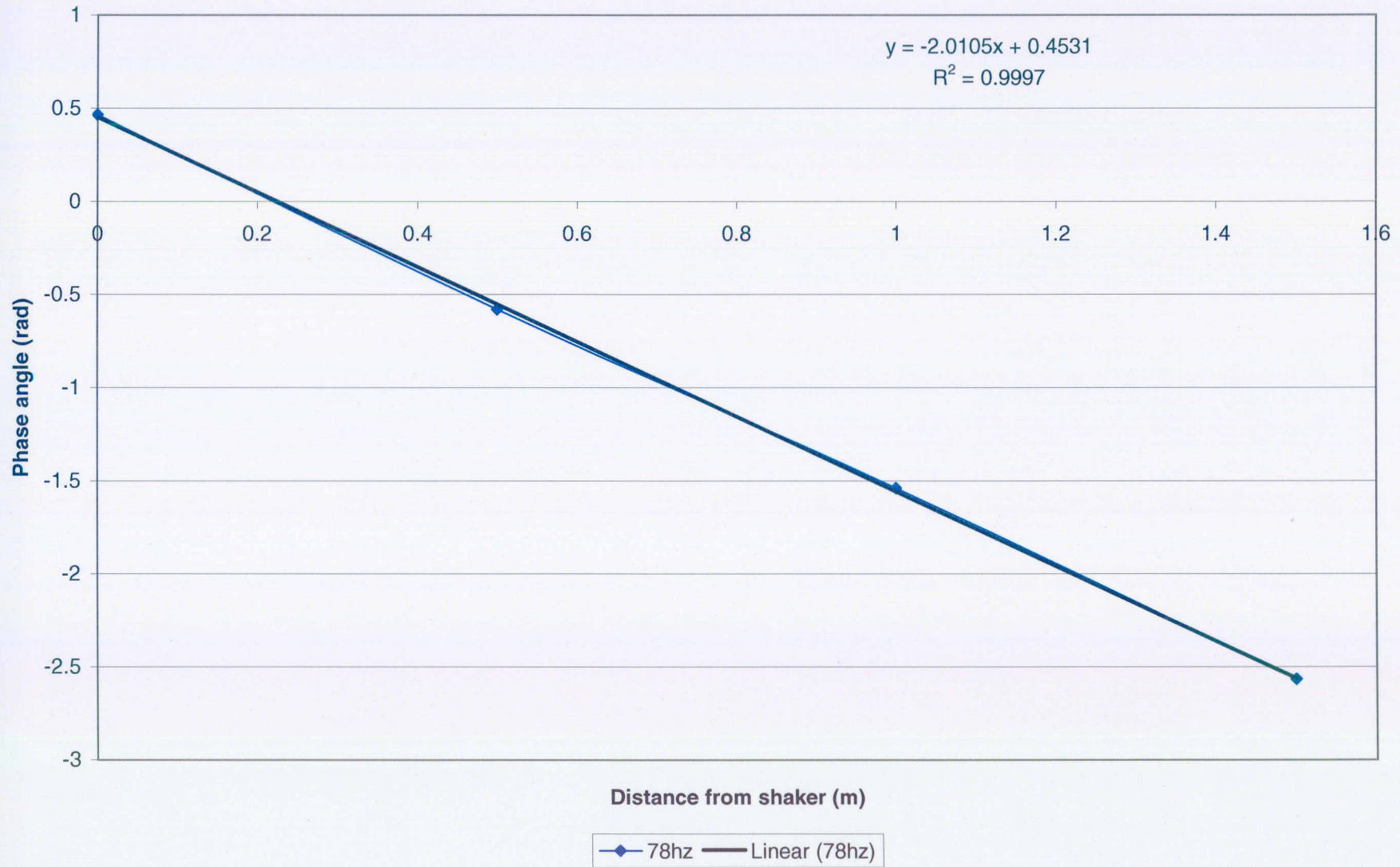
Phase plot



### Frequency Spectrum (78 Hz)

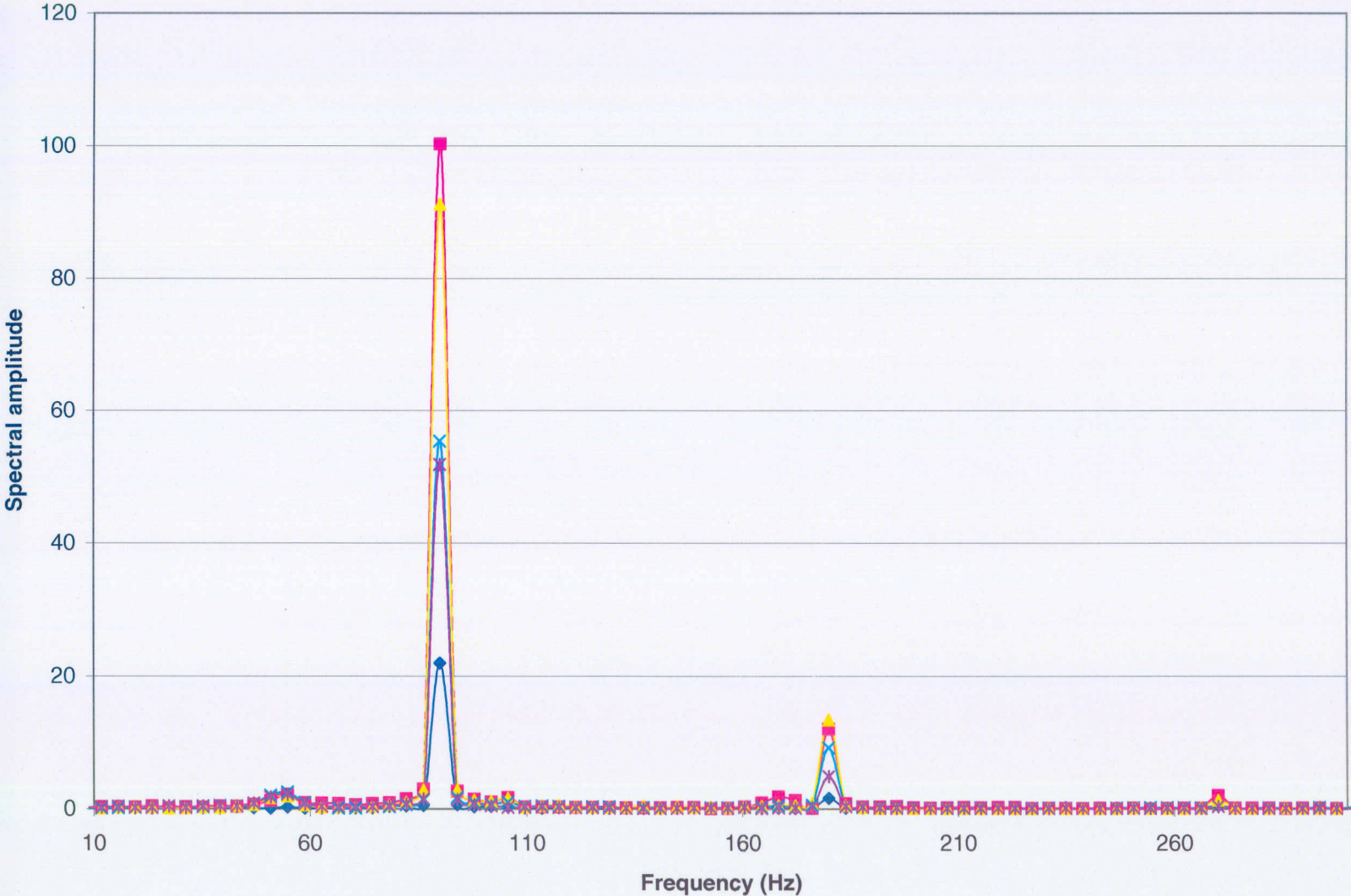


Phase plot

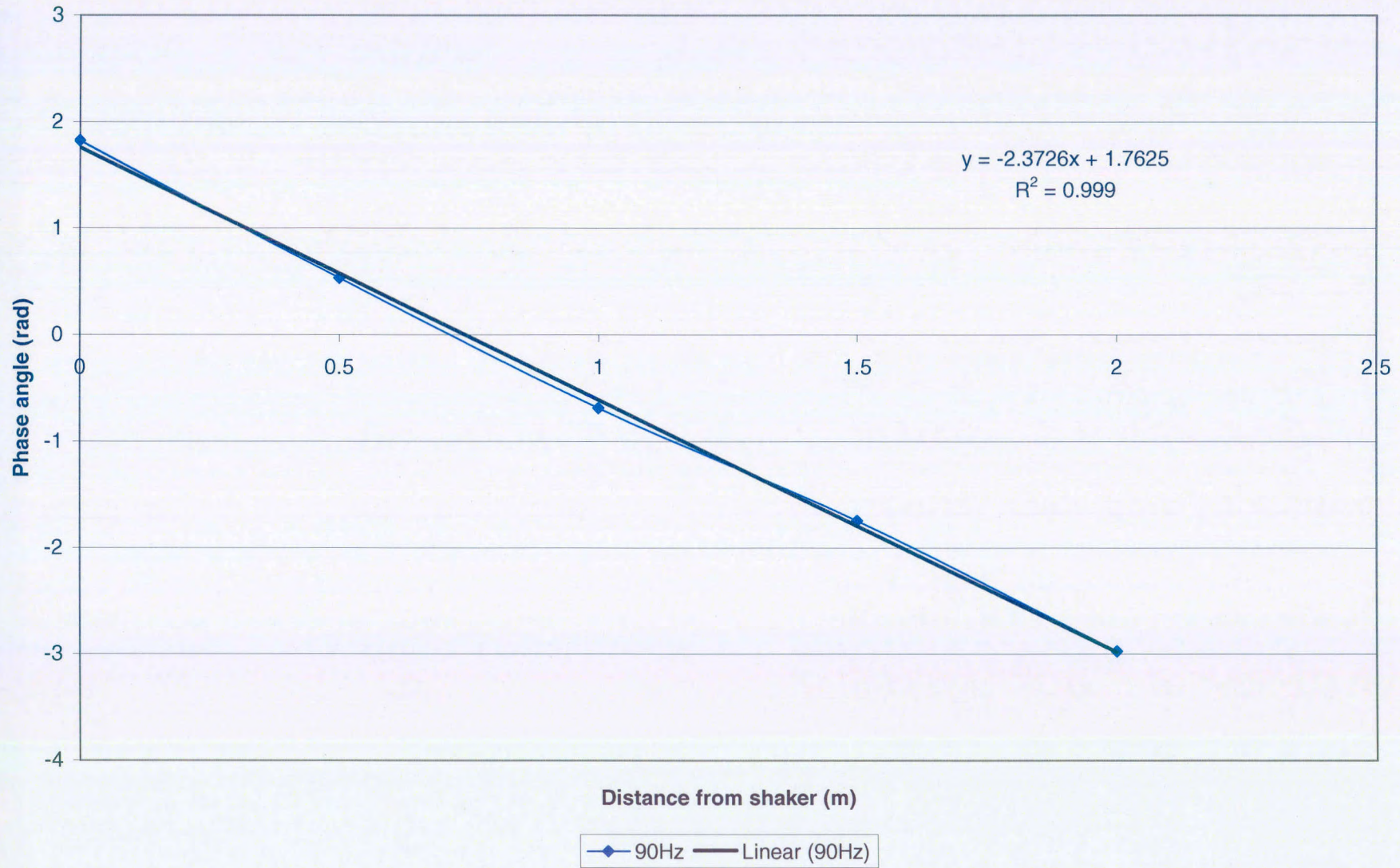




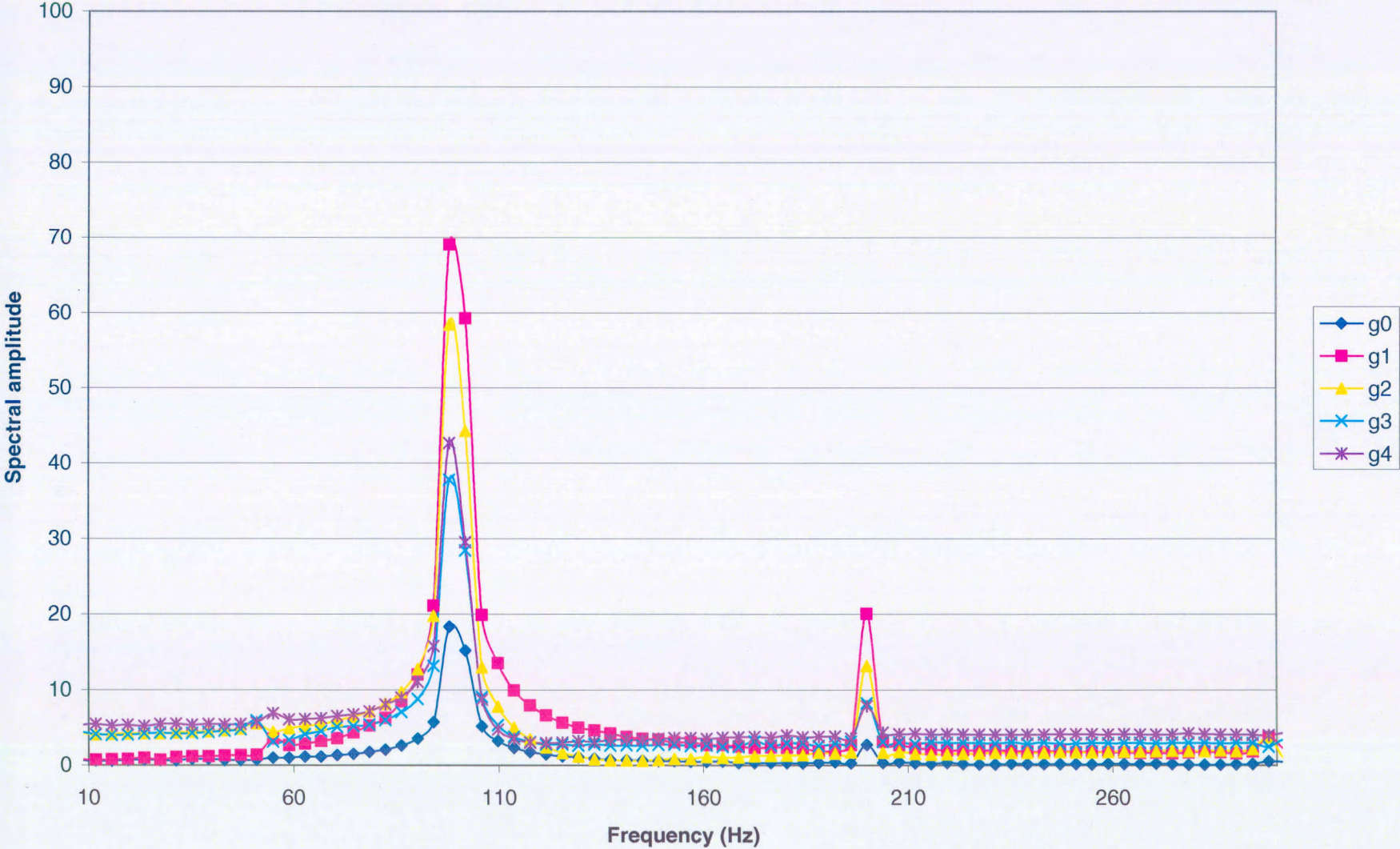
Frequency Spectrum (90 Hz)



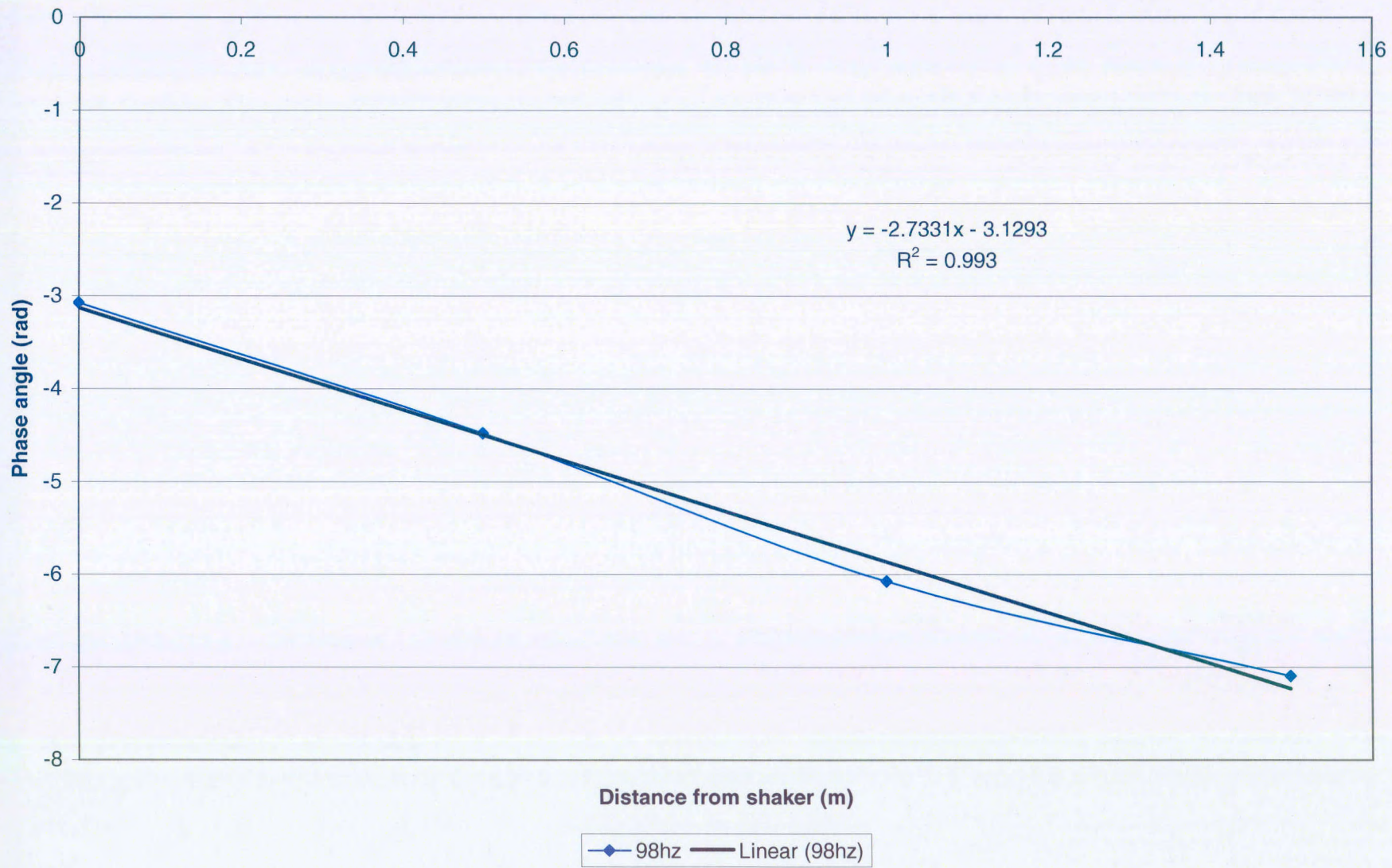
Phase plot



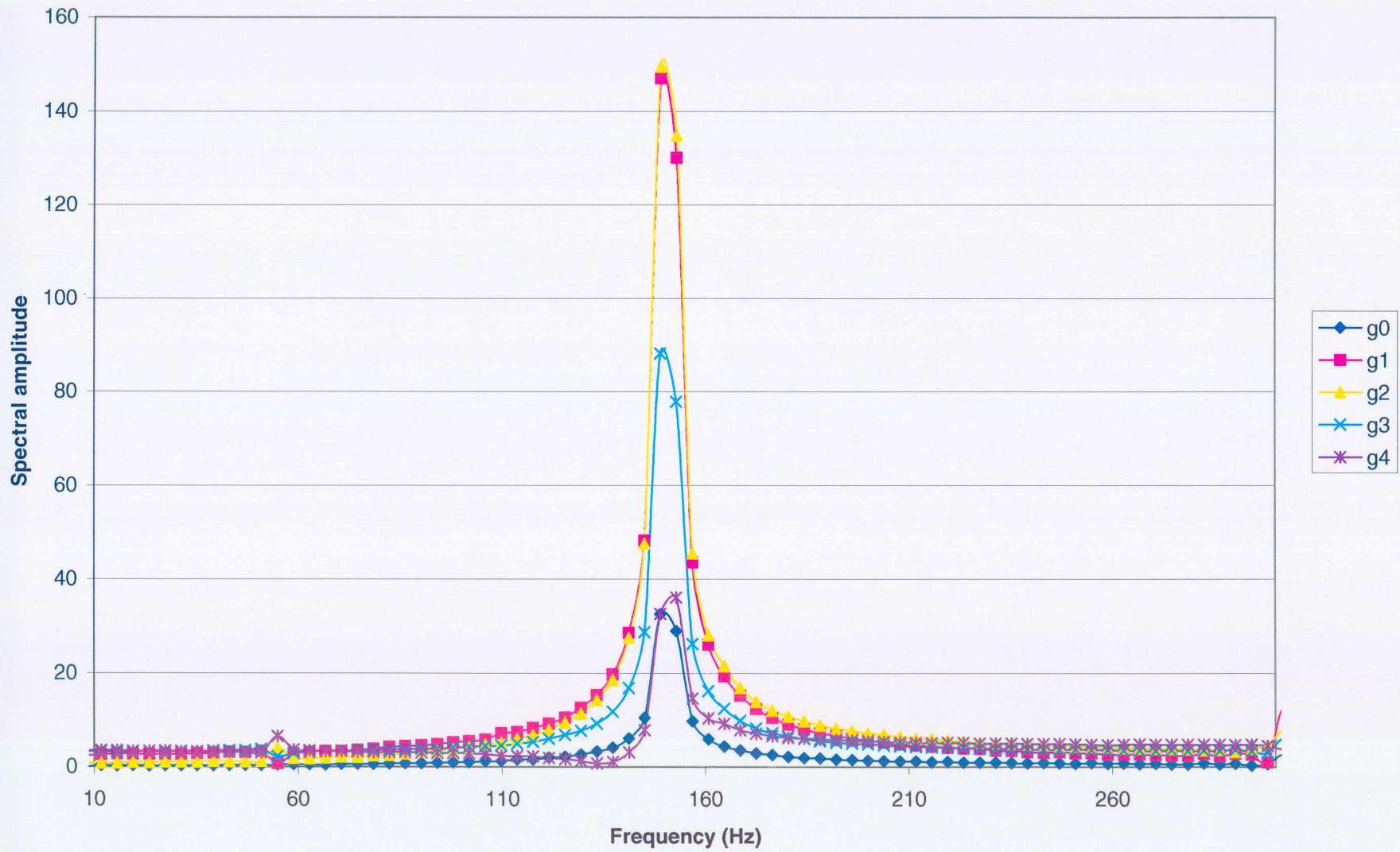
### Frequency Spectrum (98 Hz)



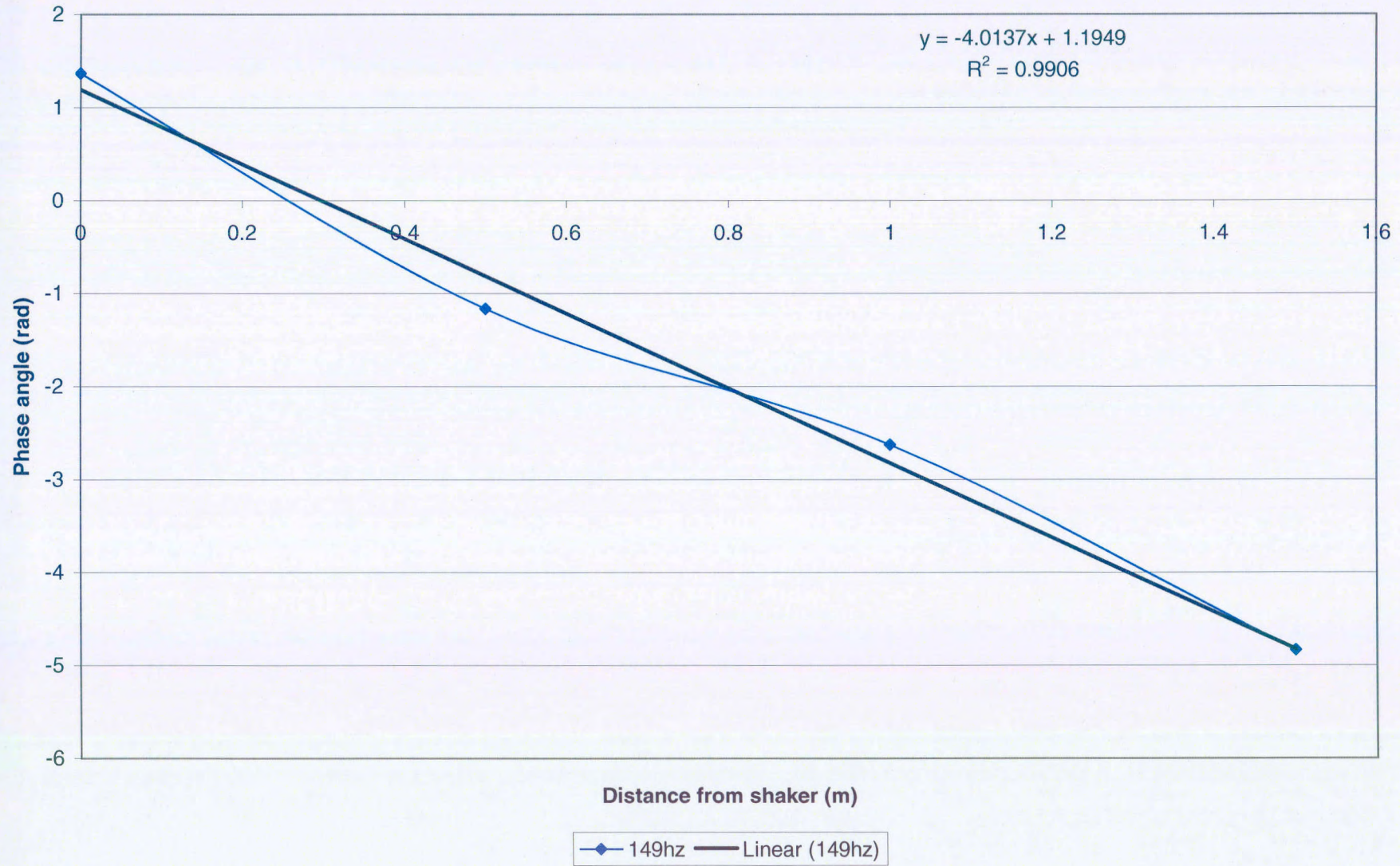
Phase plot



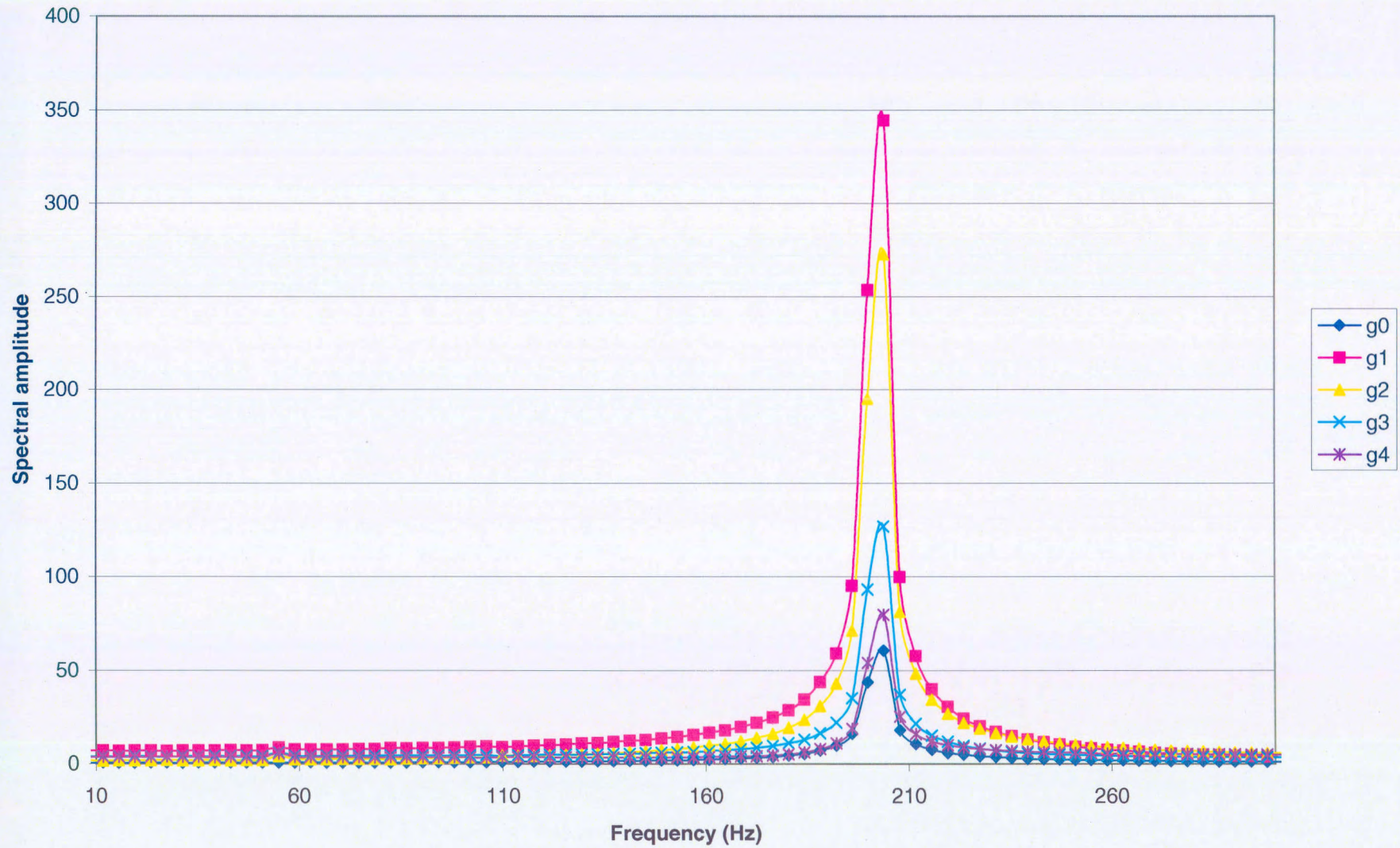
### Frequency Spectrum (149 Hz)



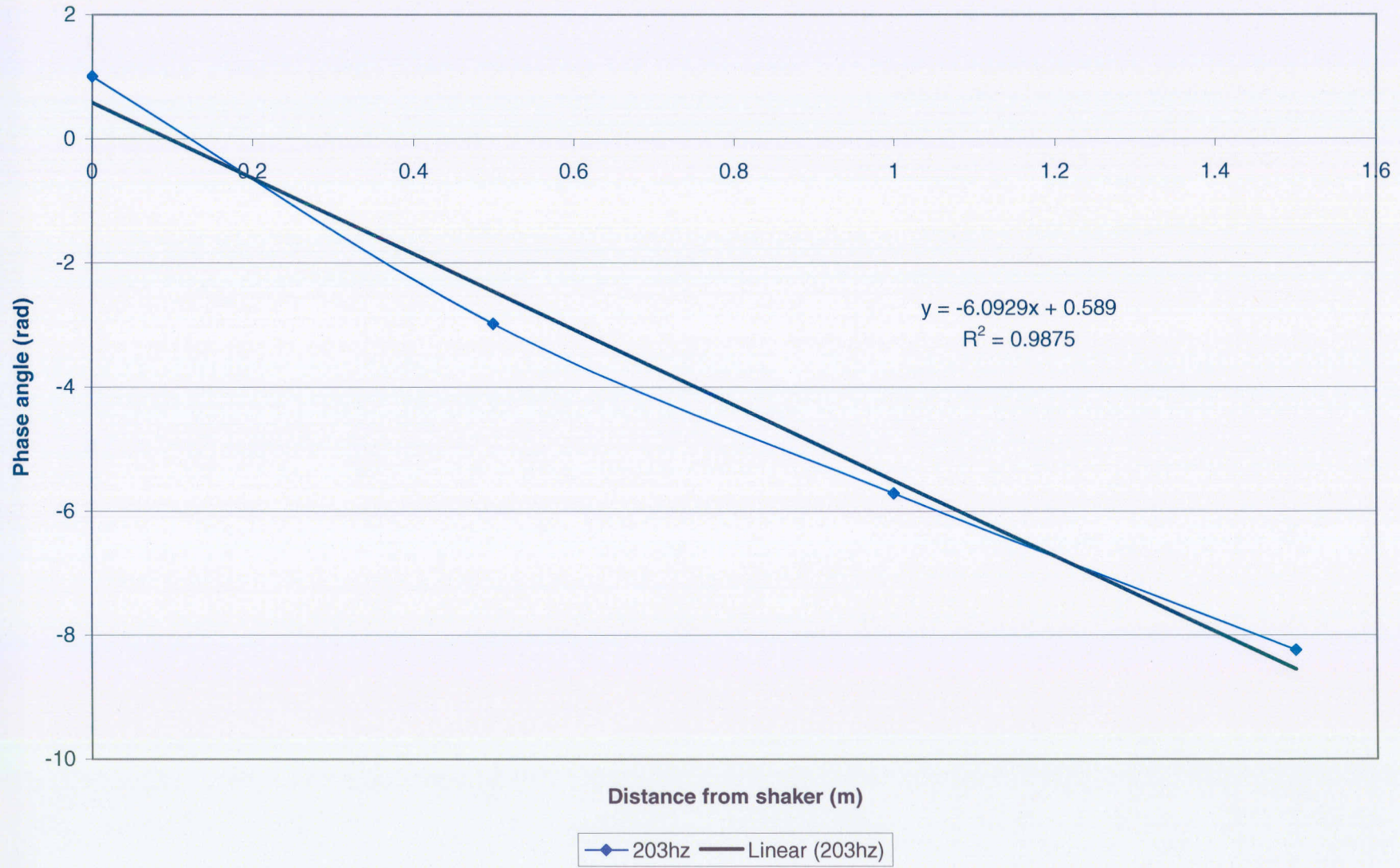
Phase plot



Frequency Spectrum (203 Hz)

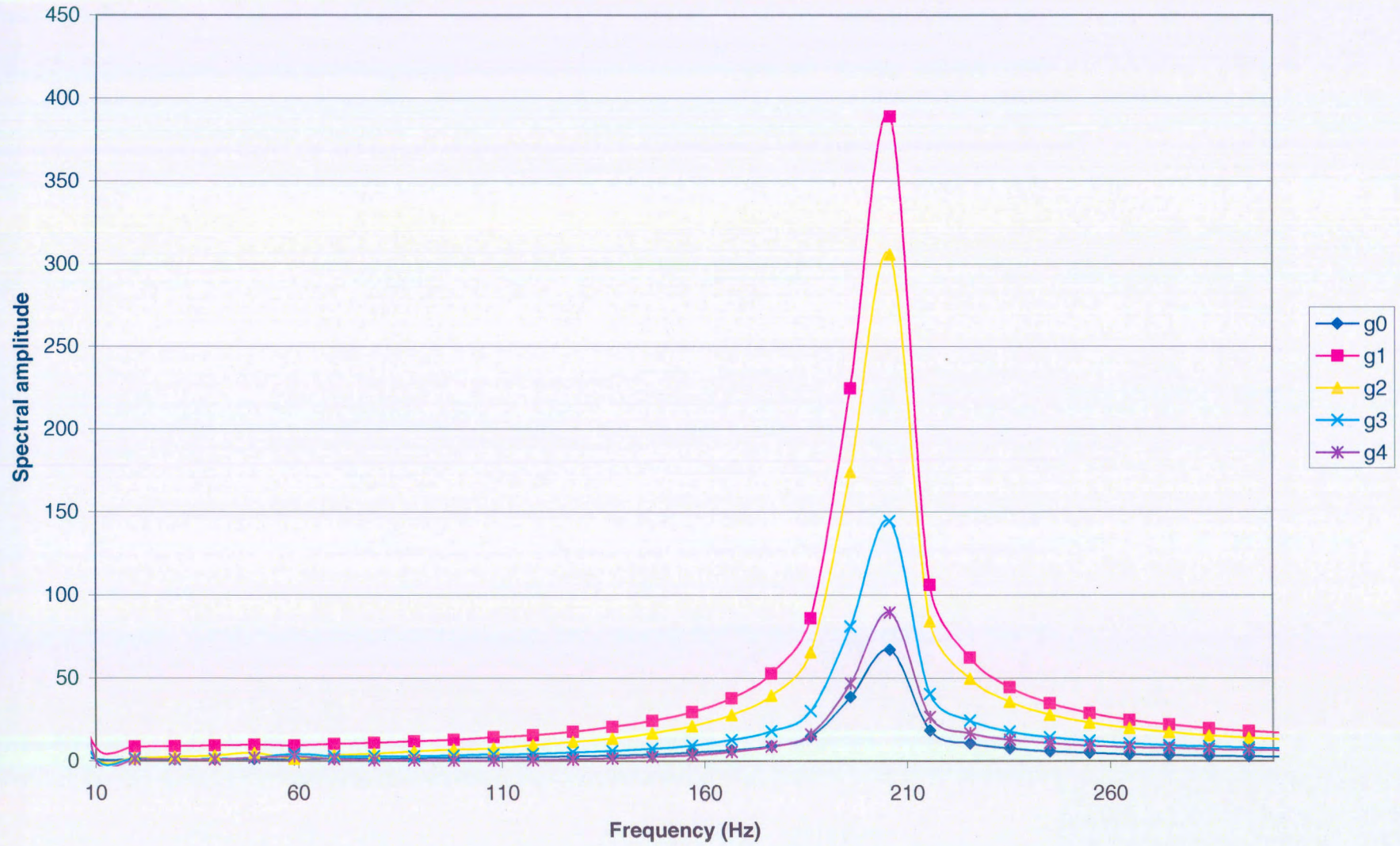


Phase plot

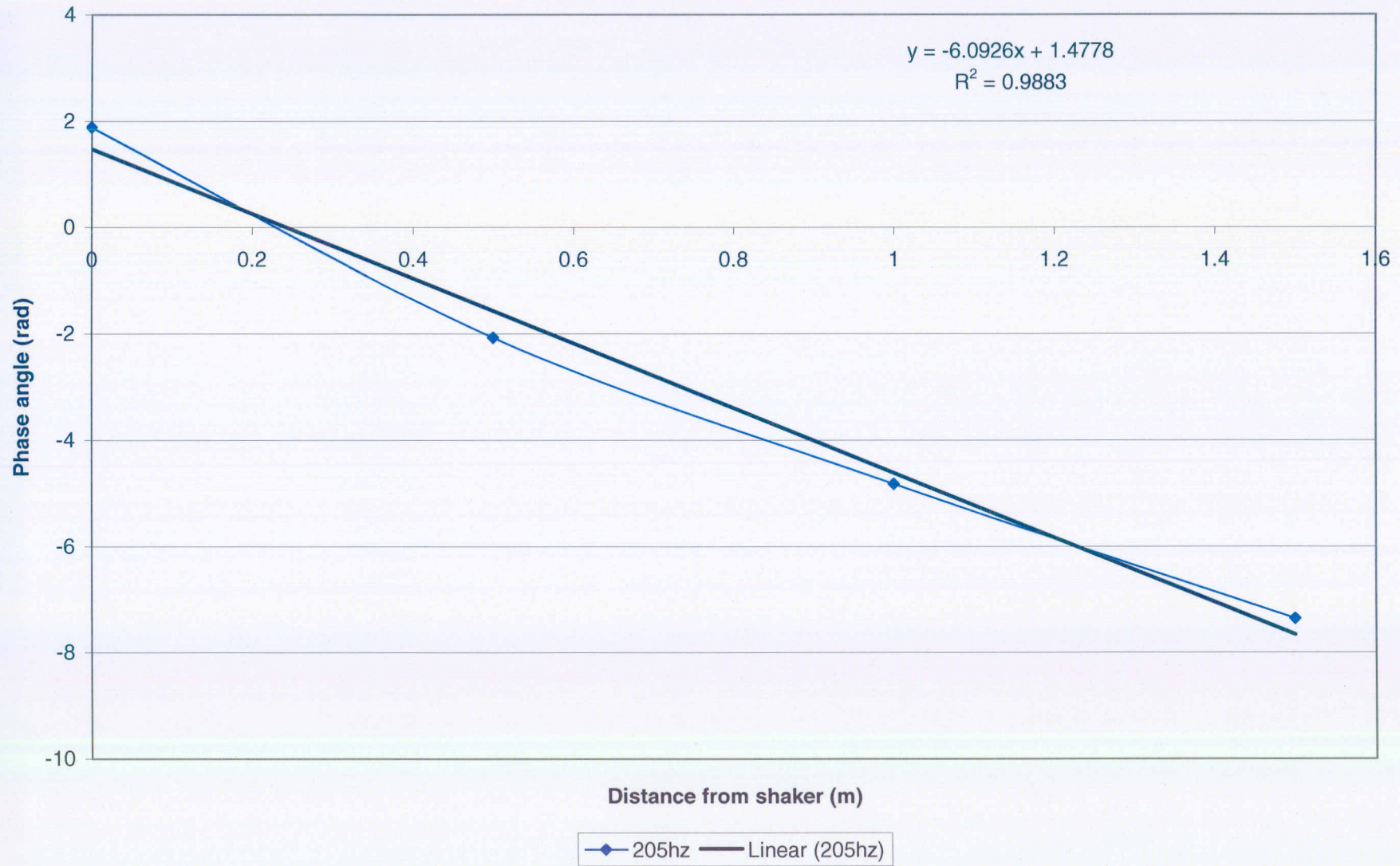




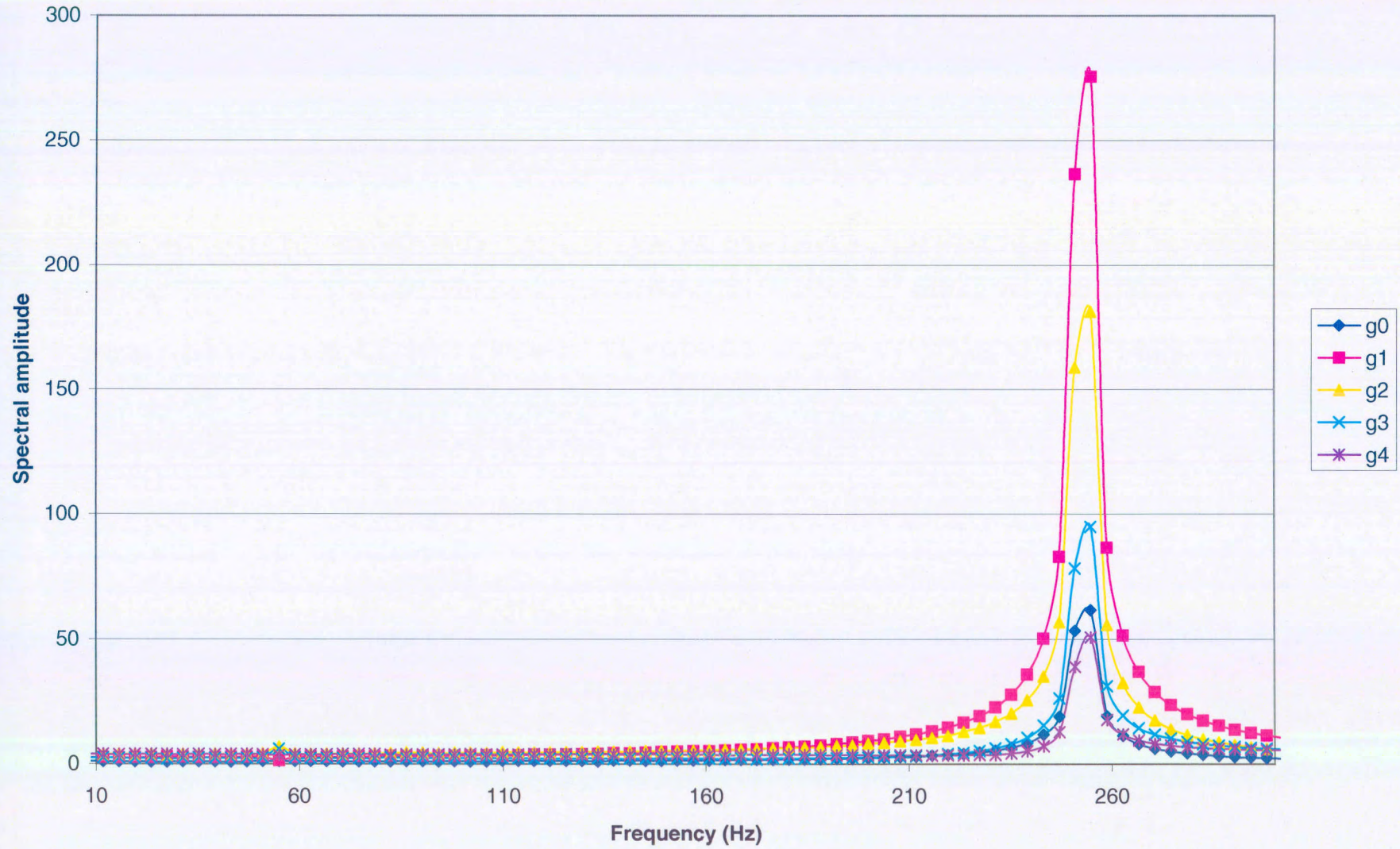
Frequency Spectrum (205 Hz)



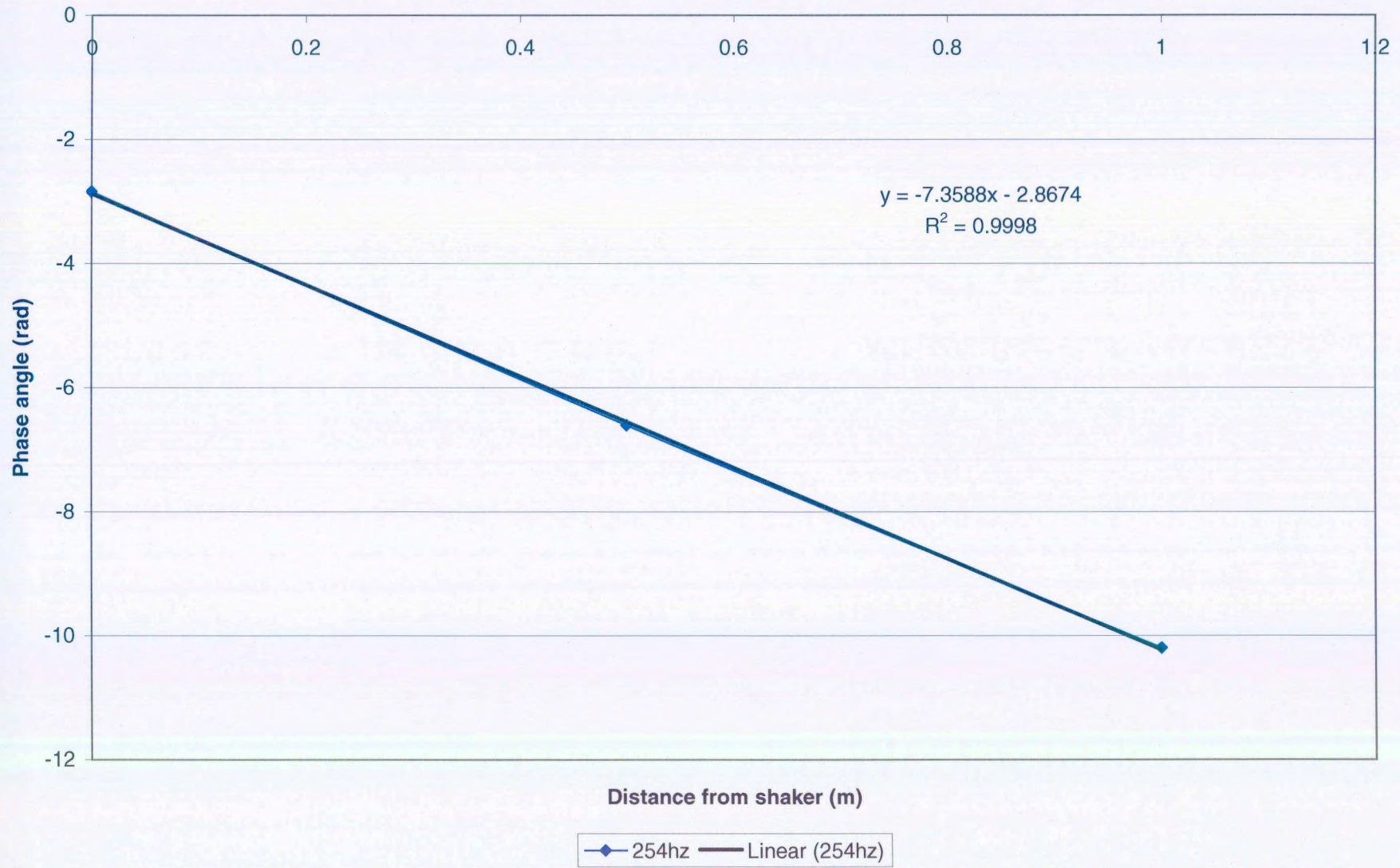
Phase plot



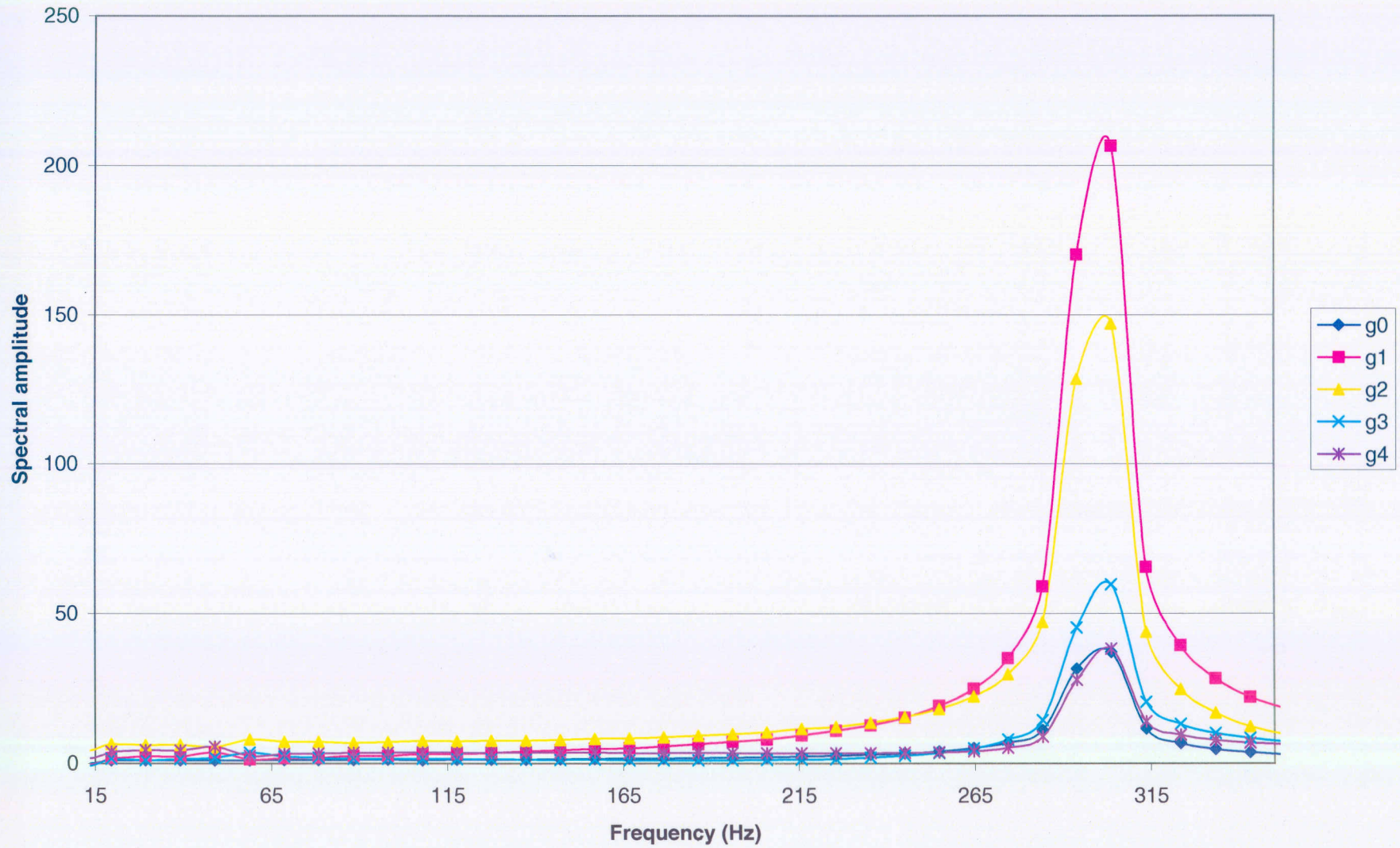
### Frequency Spectrum (254 Hz)



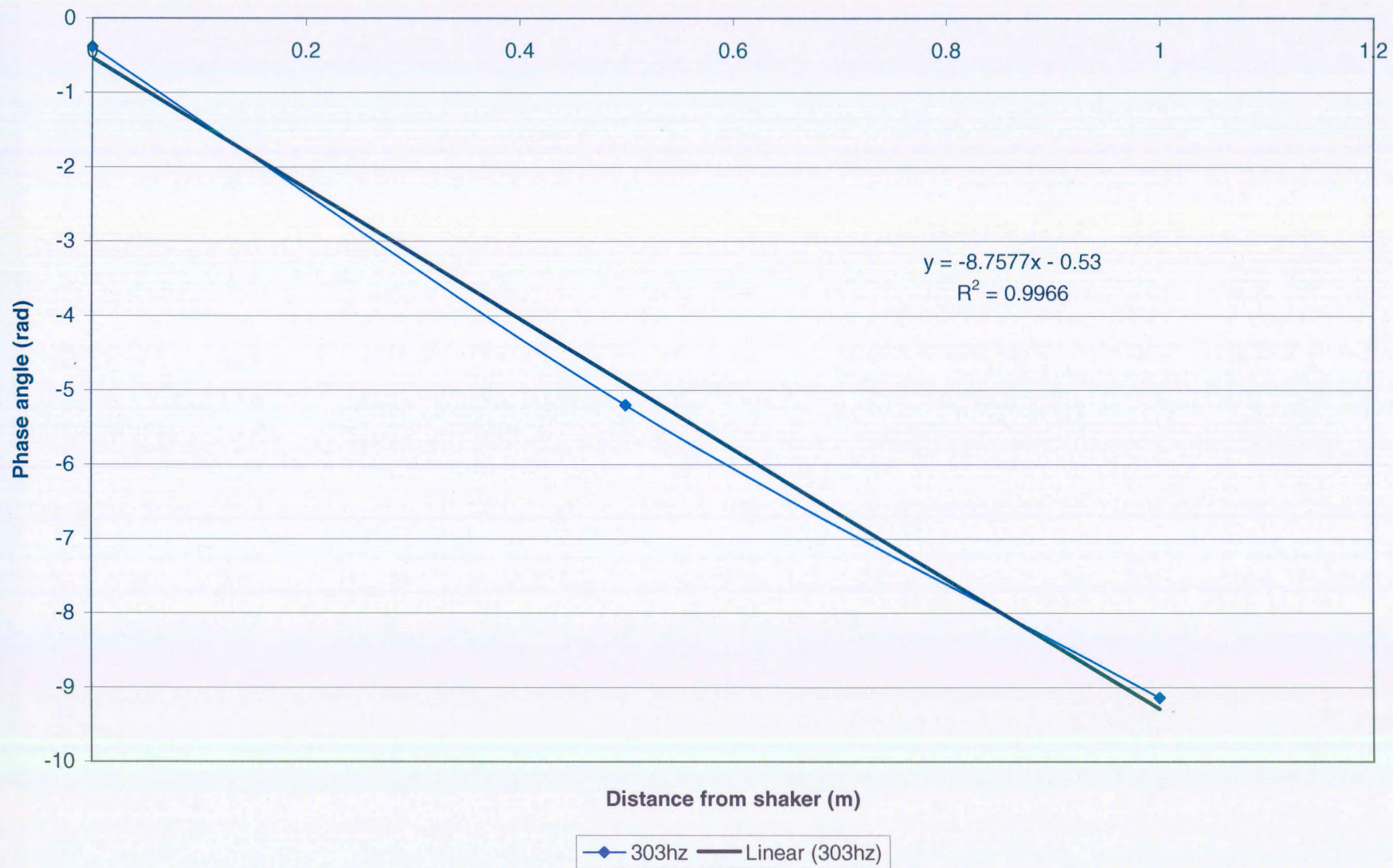
Phase plot



### Frequency Spectrum (303 Hz)



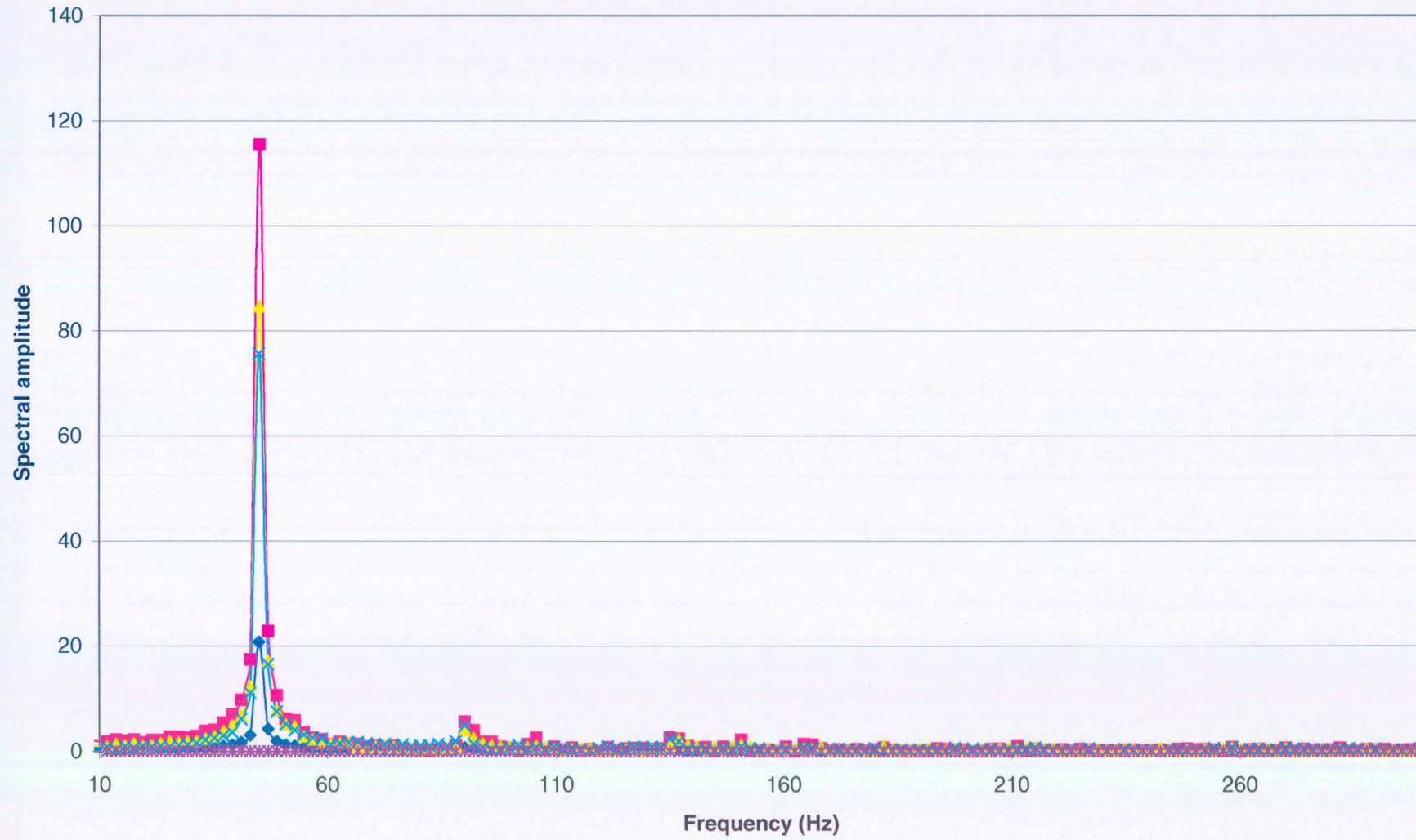
Phase plot





**Appendix C**  
**Phase plots and frequency spectrum for the compacted**  
**CSW testing**

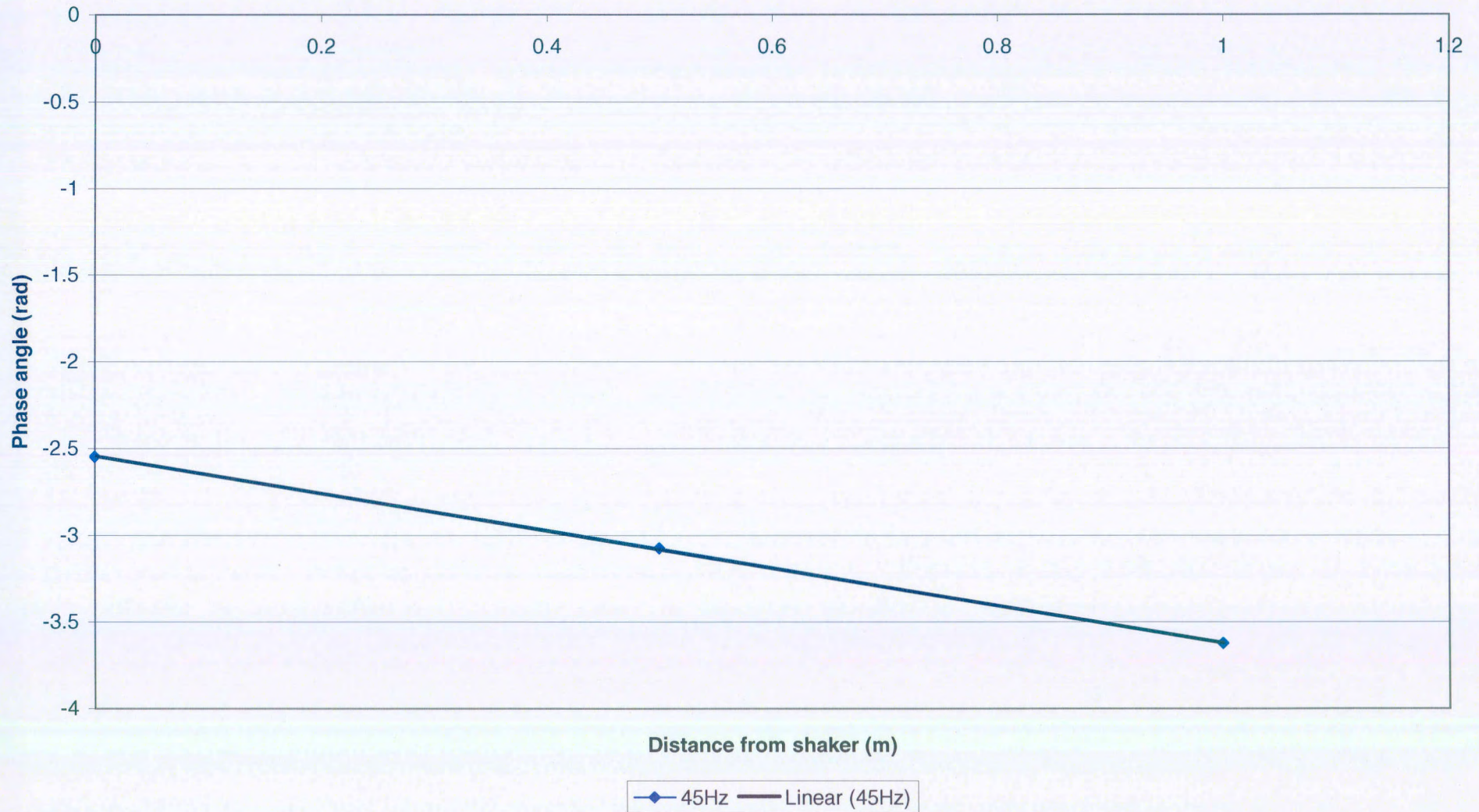
### Frequency Spectrum (45 Hz)



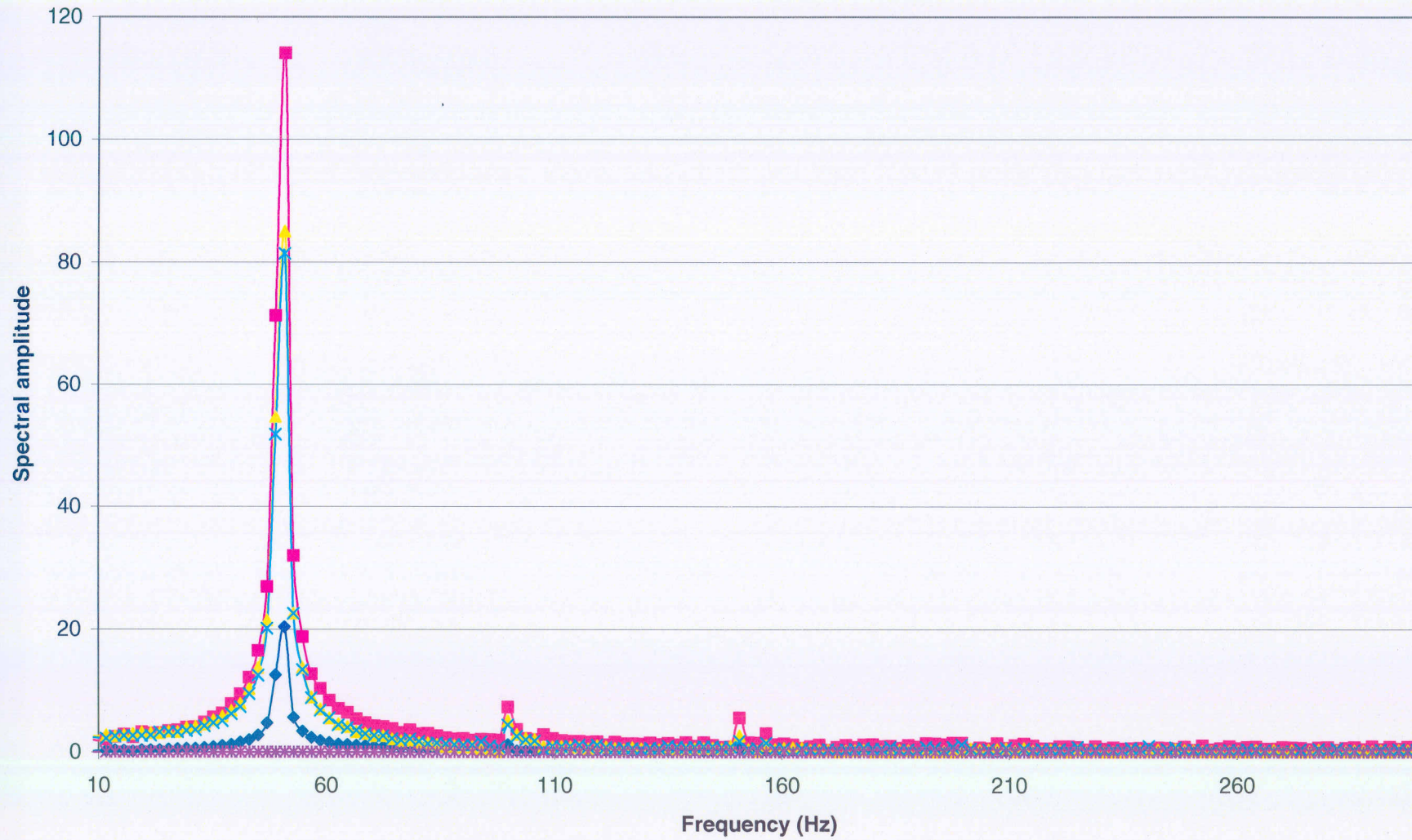


Phase plot

$$y = -1.0751x - 2.5442$$
$$R^2 = 0.9999$$

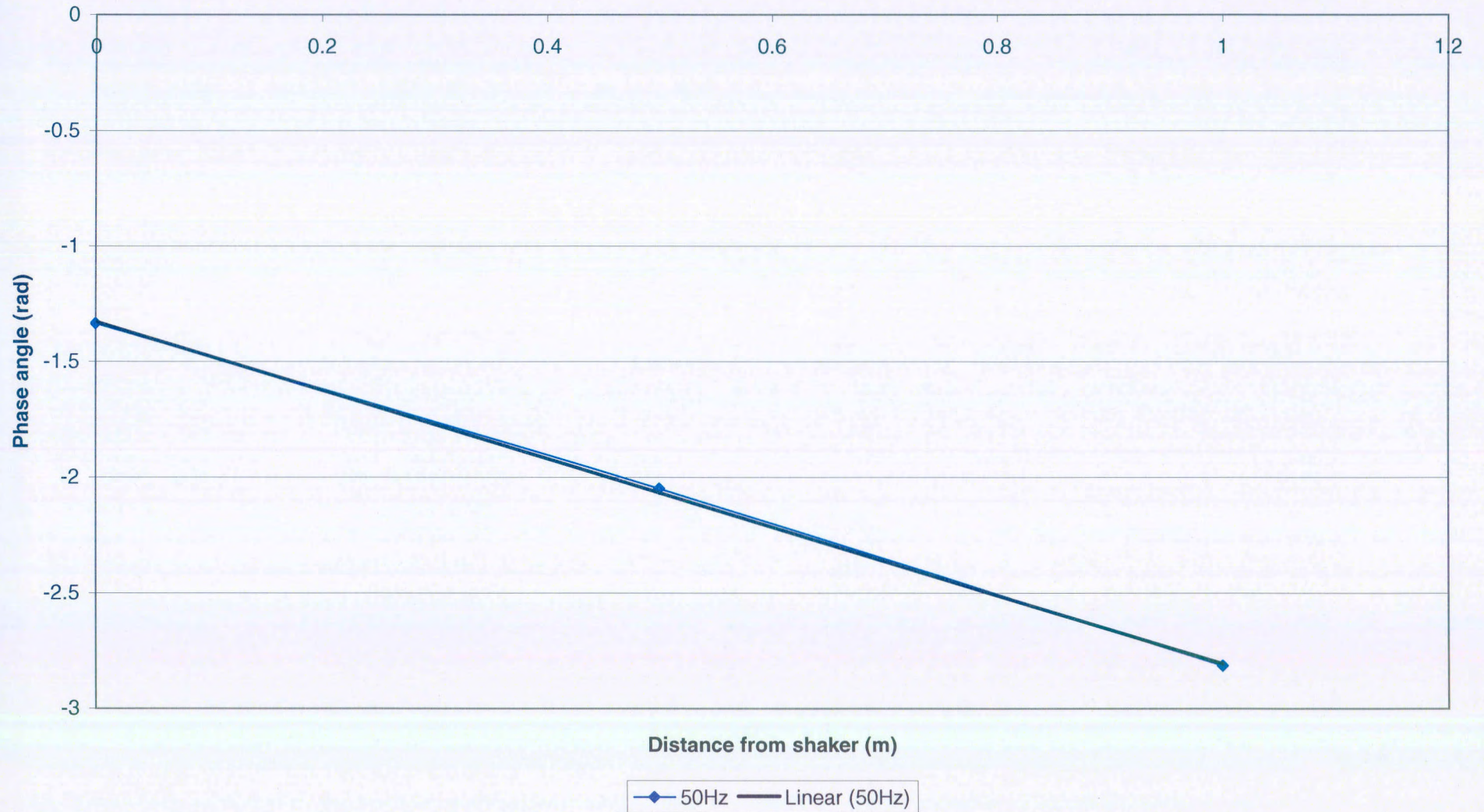


Frequency Spectrum (50 Hz)

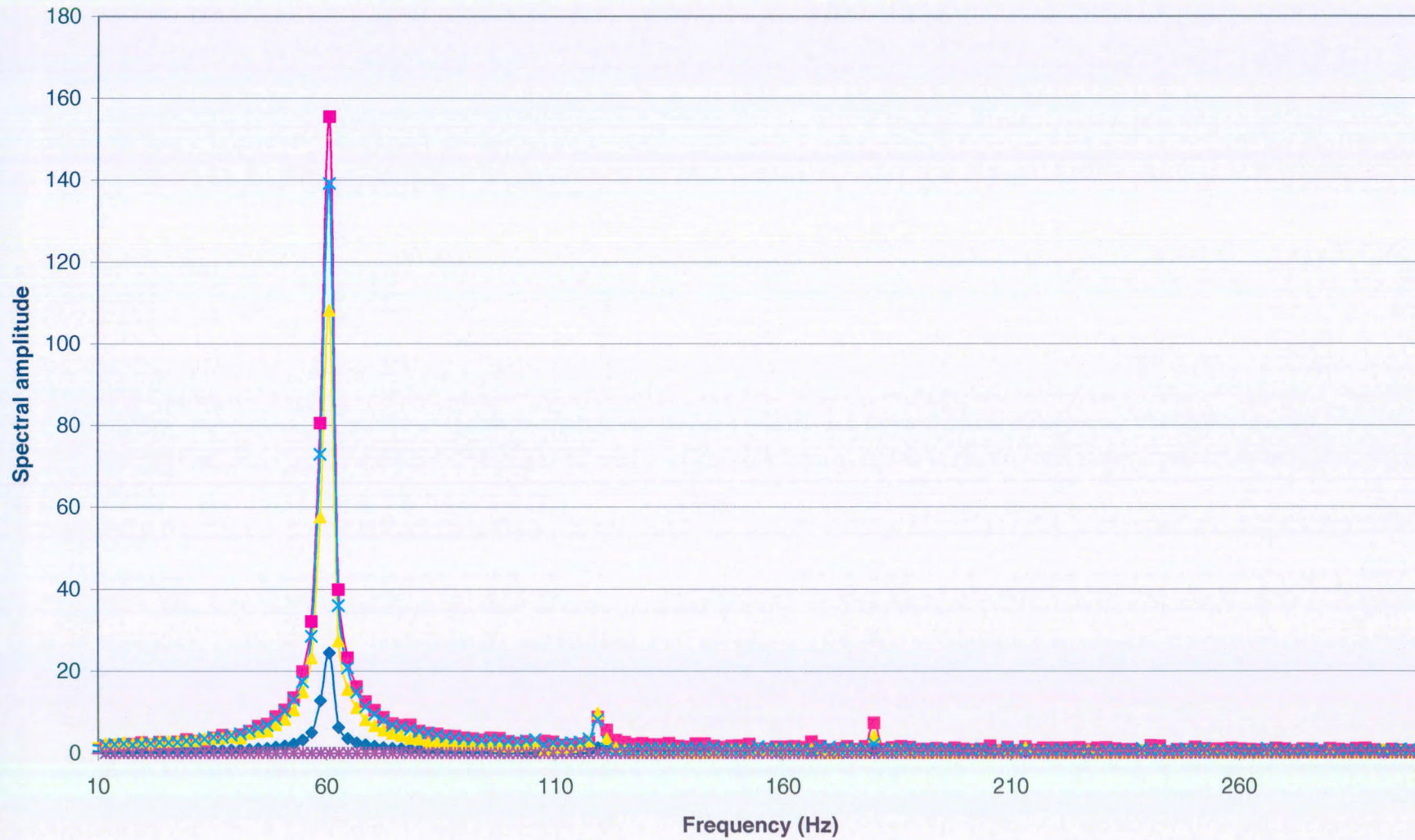


Phase plot

$$y = -1.4784x - 1.3272$$
$$R^2 = 0.9996$$



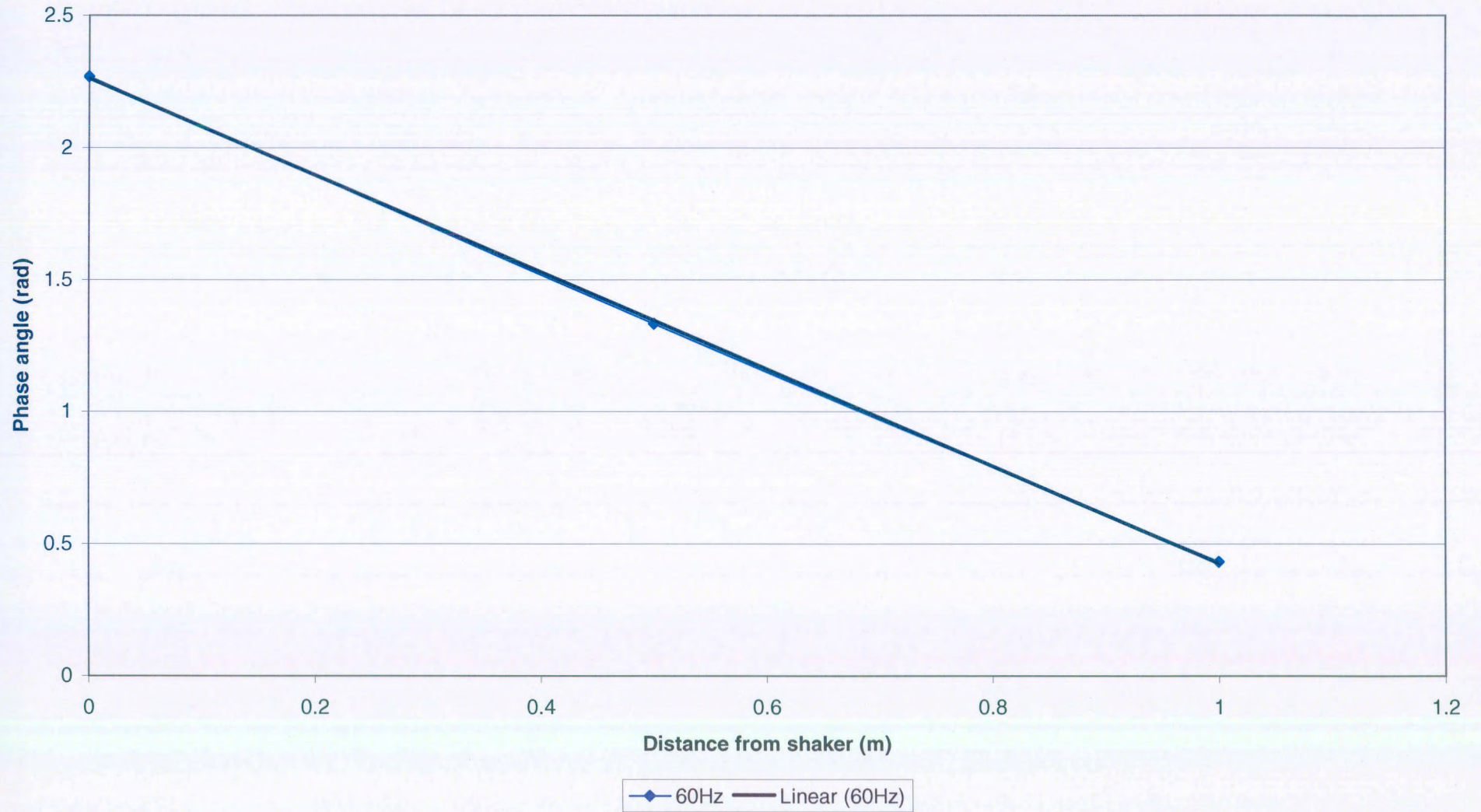
Frequency Spectrum (60 Hz)



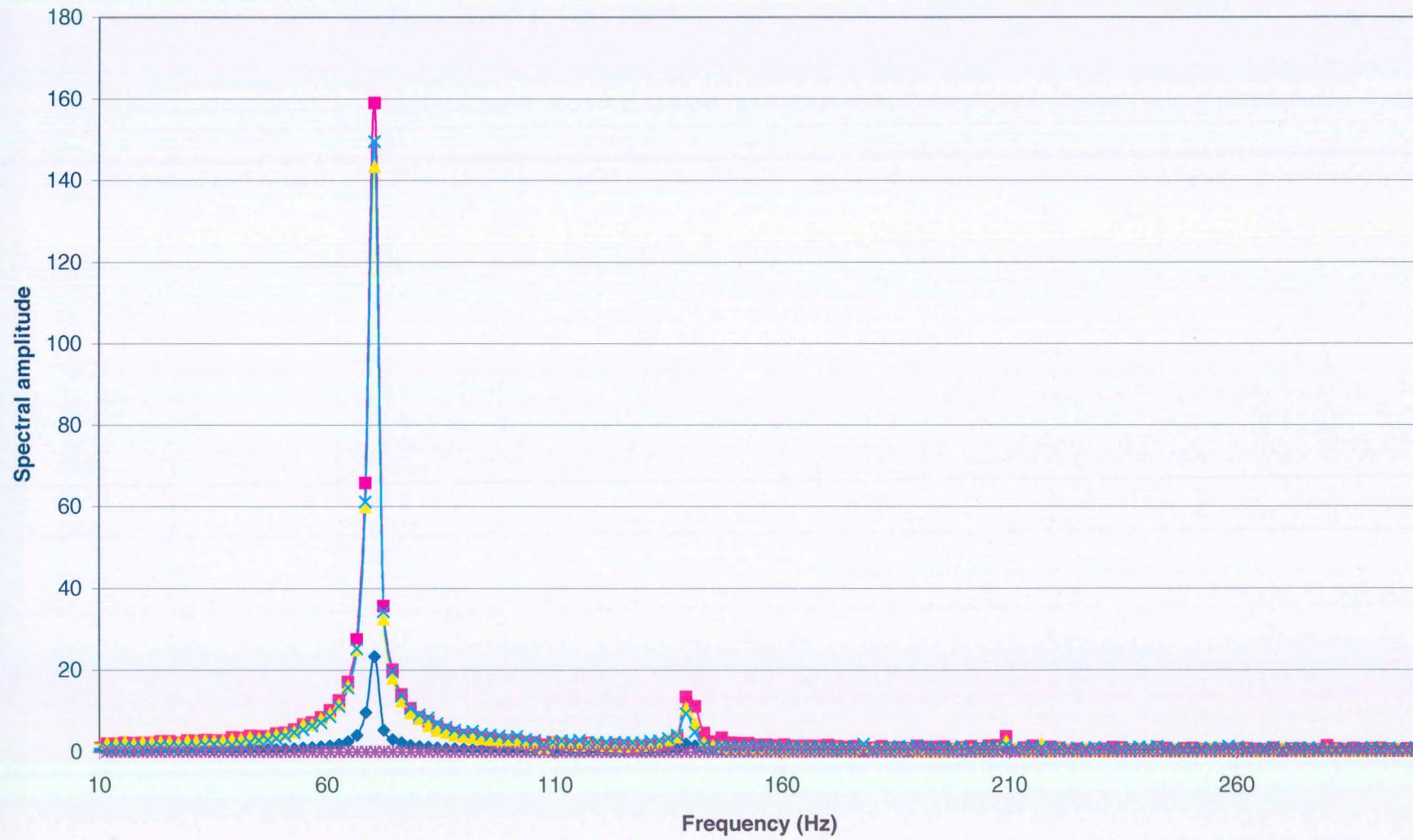
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YUNIBESITHI YA PRETORIA

Phase plot

$$y = -1.8373x + 2.2635$$
$$R^2 = 0.9999$$

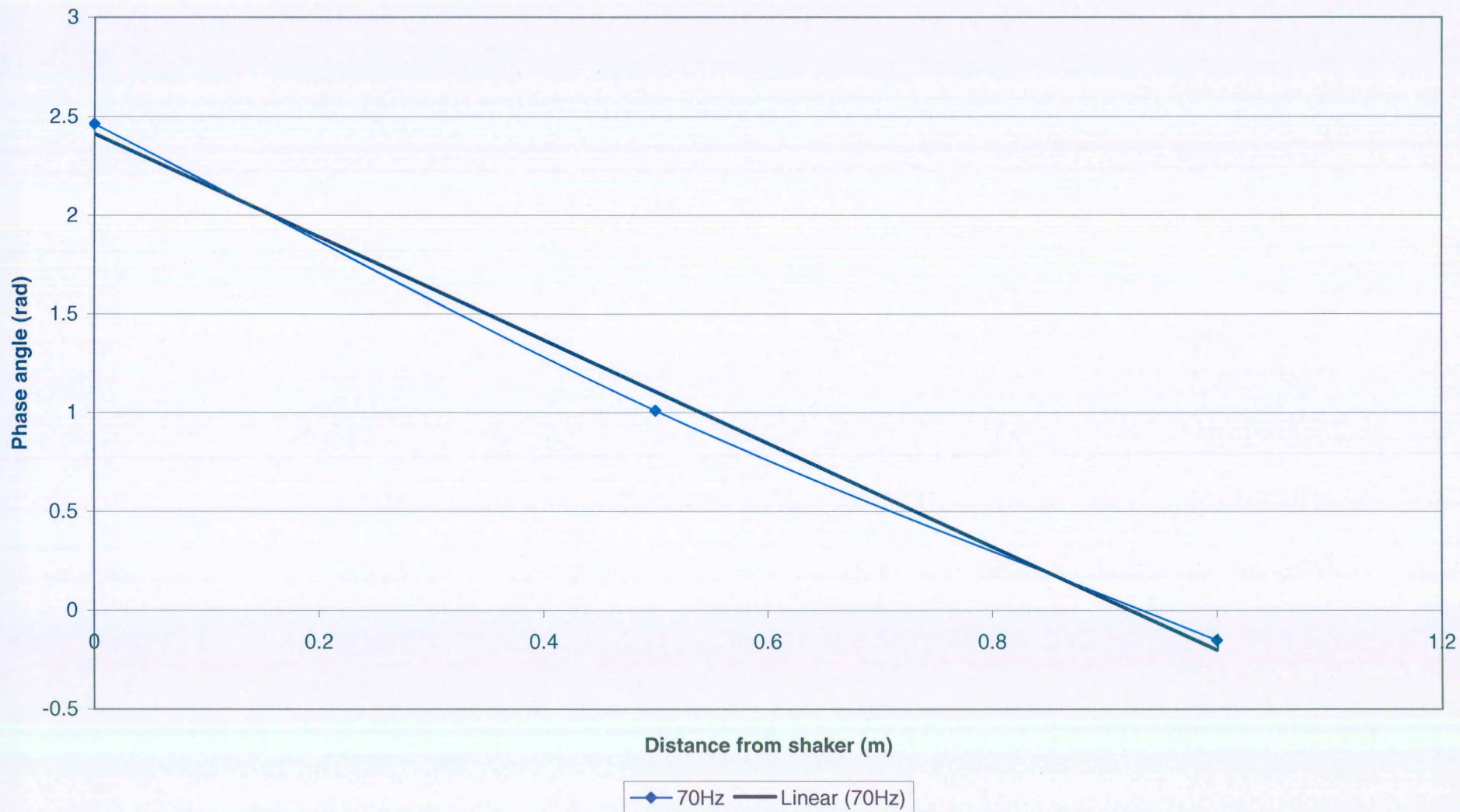


Frequency Spectrum (70 Hz)

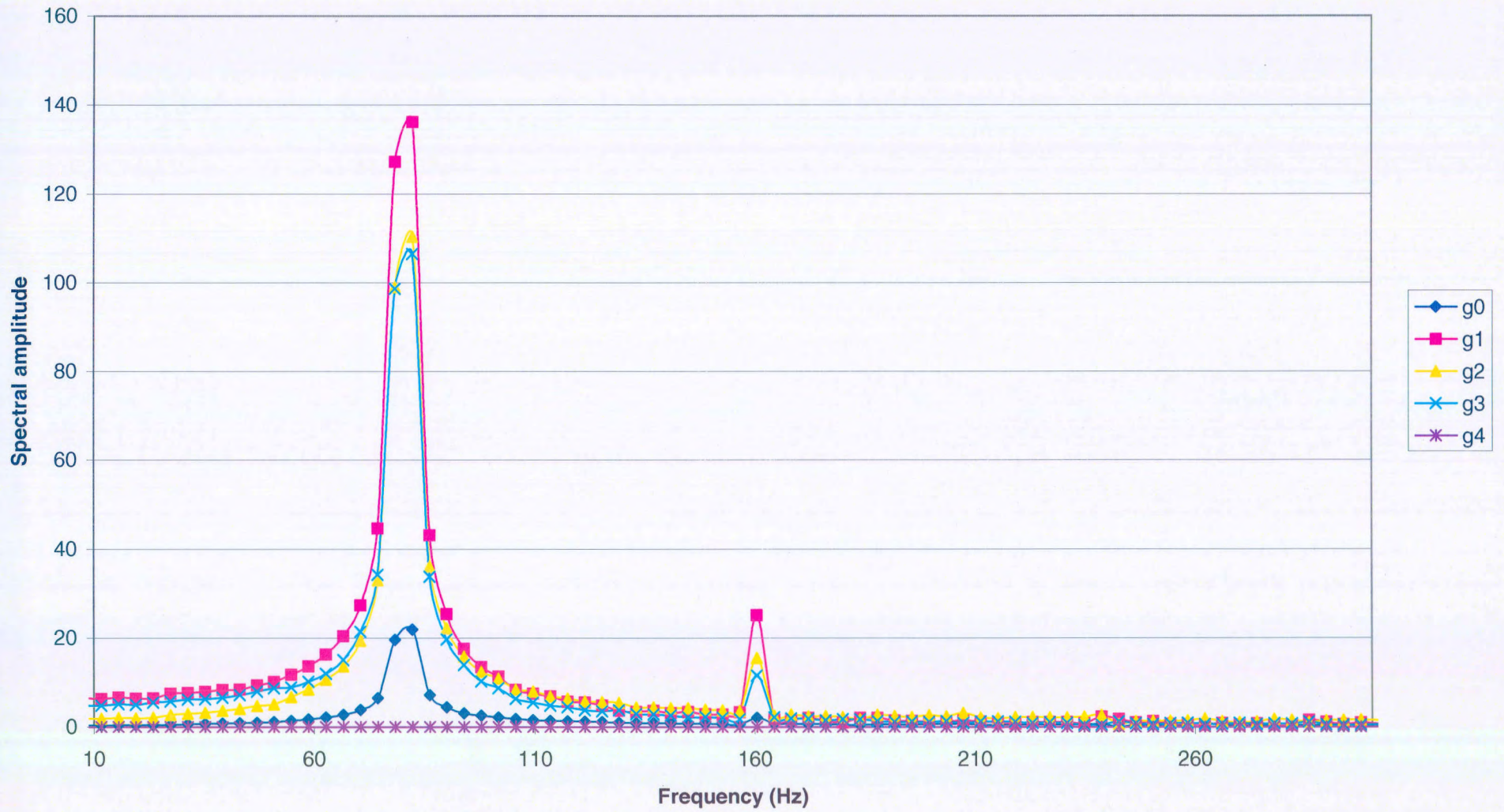


Phase plot

$$y = -2.6128x + 2.4132$$
$$R^2 = 0.9959$$



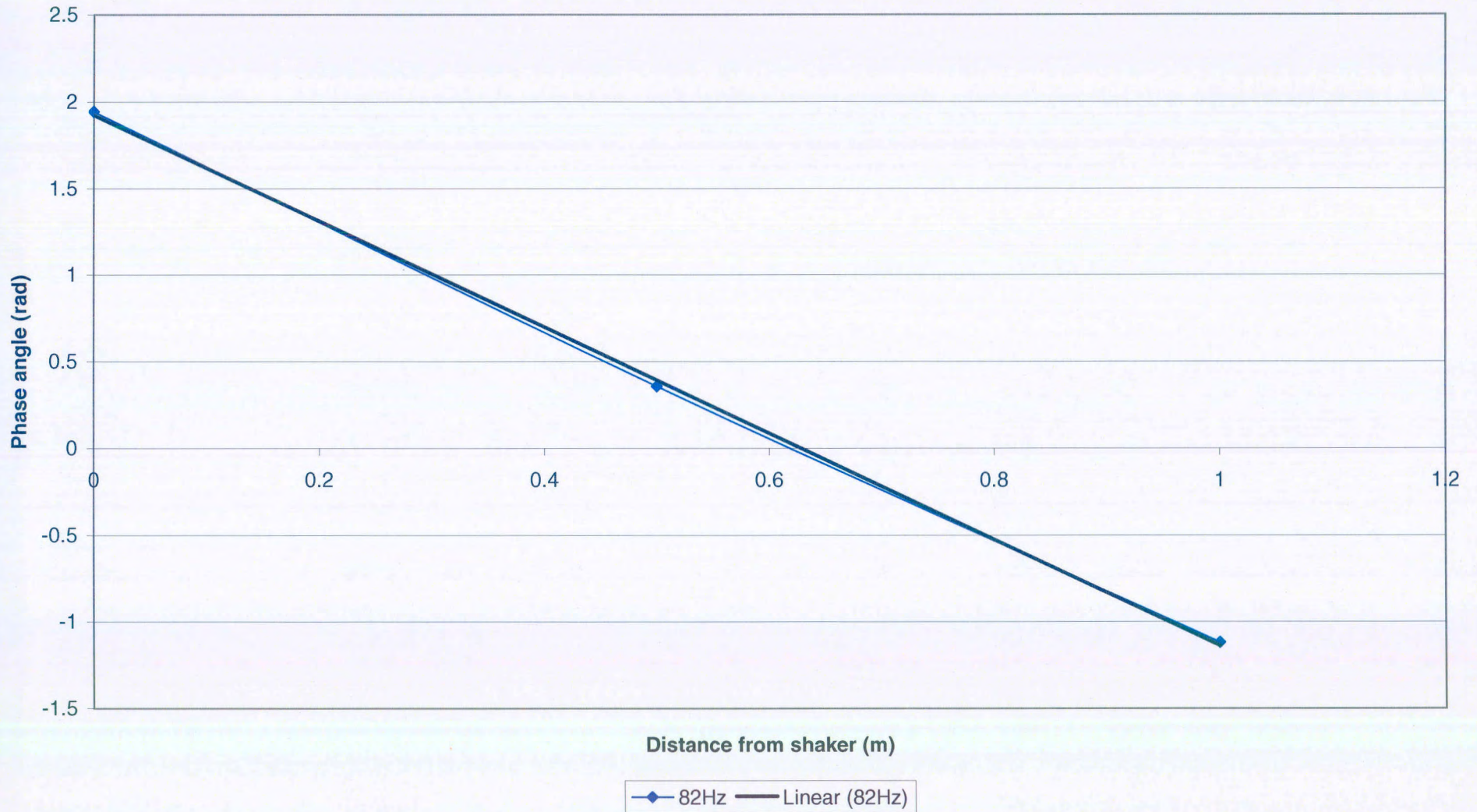
Frequency Spectrum (82 Hz)



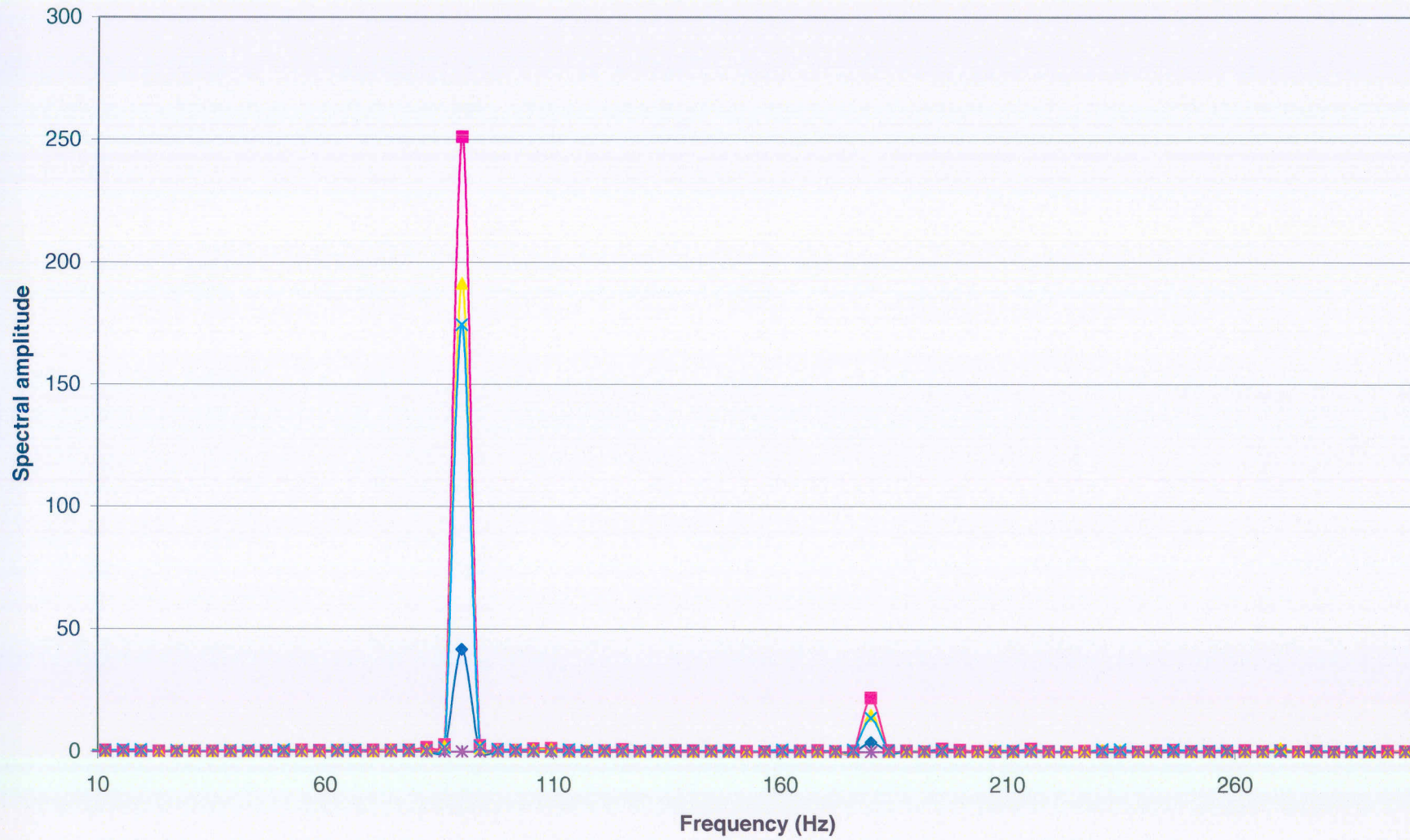


Phase plot

$$y = -3.0615x + 1.9246$$
$$R^2 = 0.9996$$

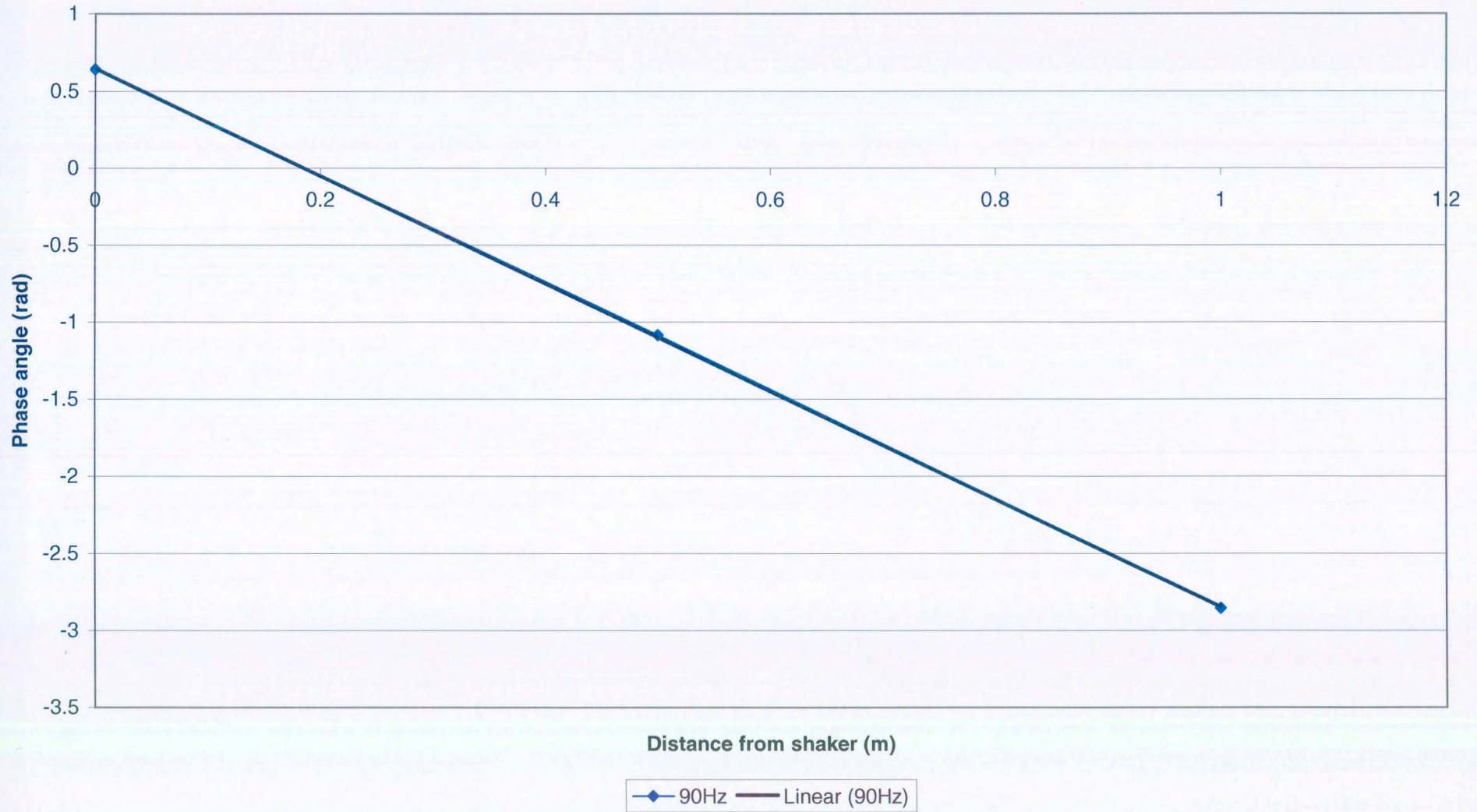


Frequency Spectrum (90 Hz)

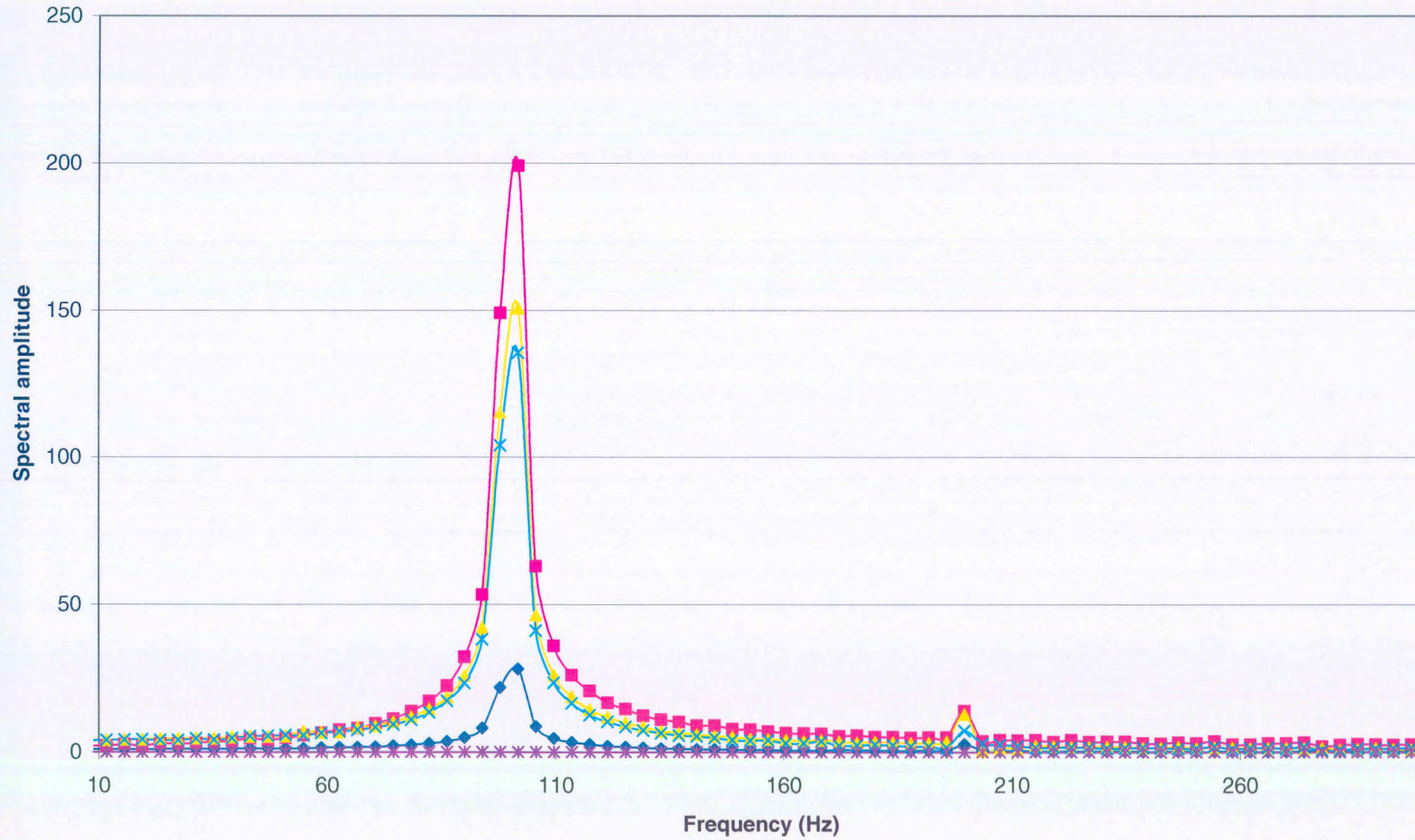


Phase plot

$$y = -3.4956x + 0.6482$$
$$R^2 = 1$$

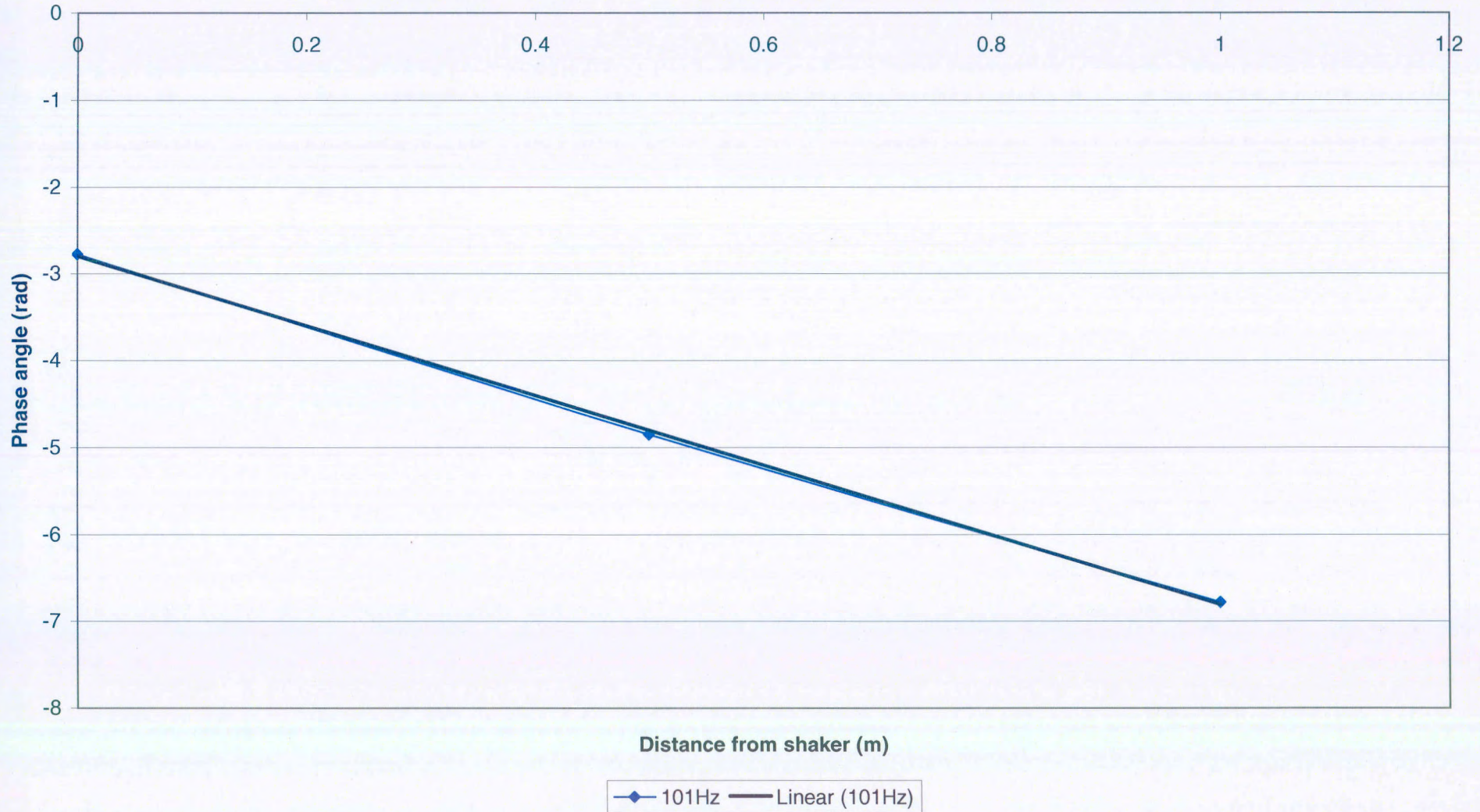


Frequency Spectrum (101 Hz)

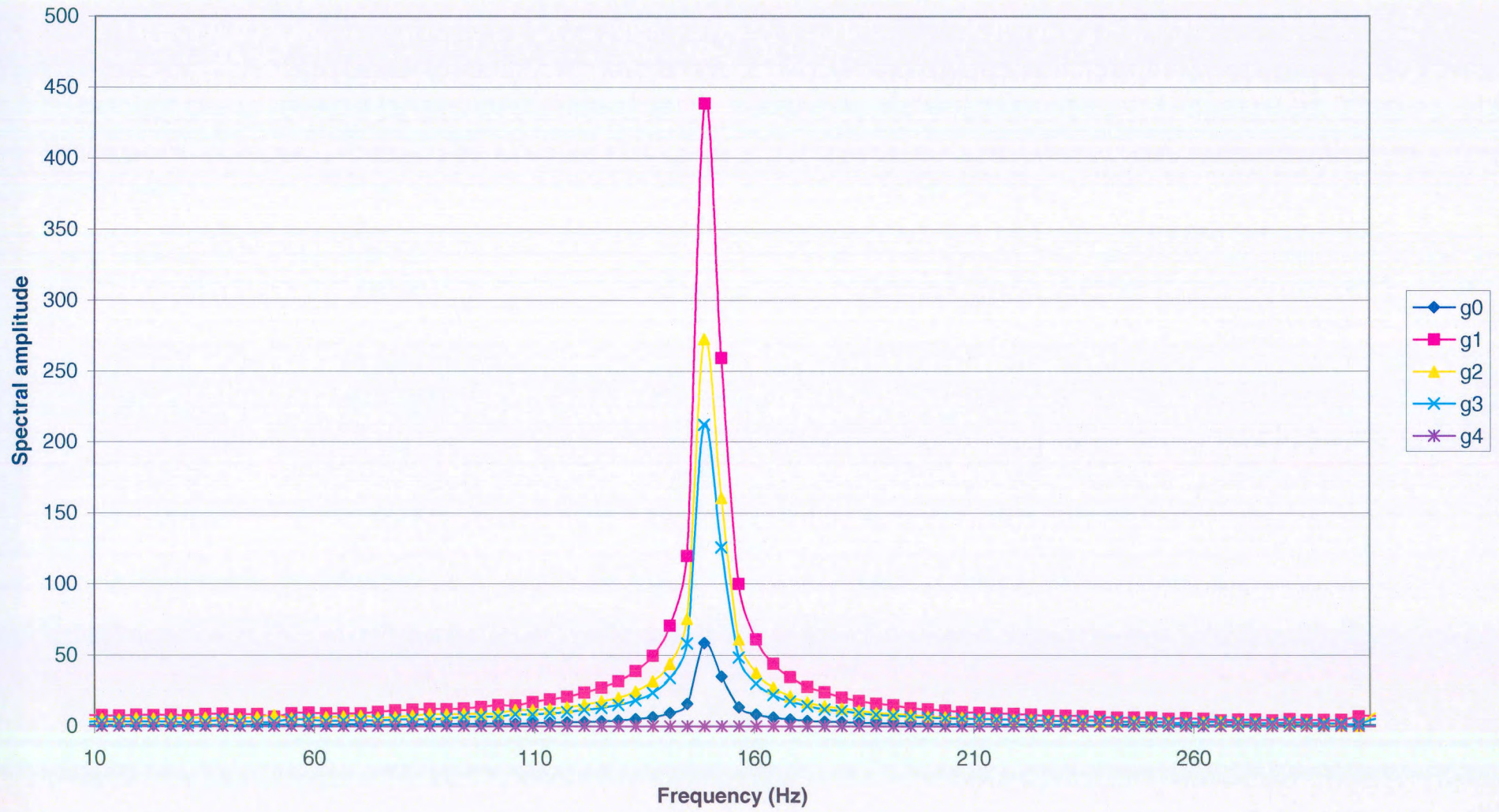


Phase plot

$$y = -4.0064x - 2.7981$$
$$R^2 = 0.9996$$

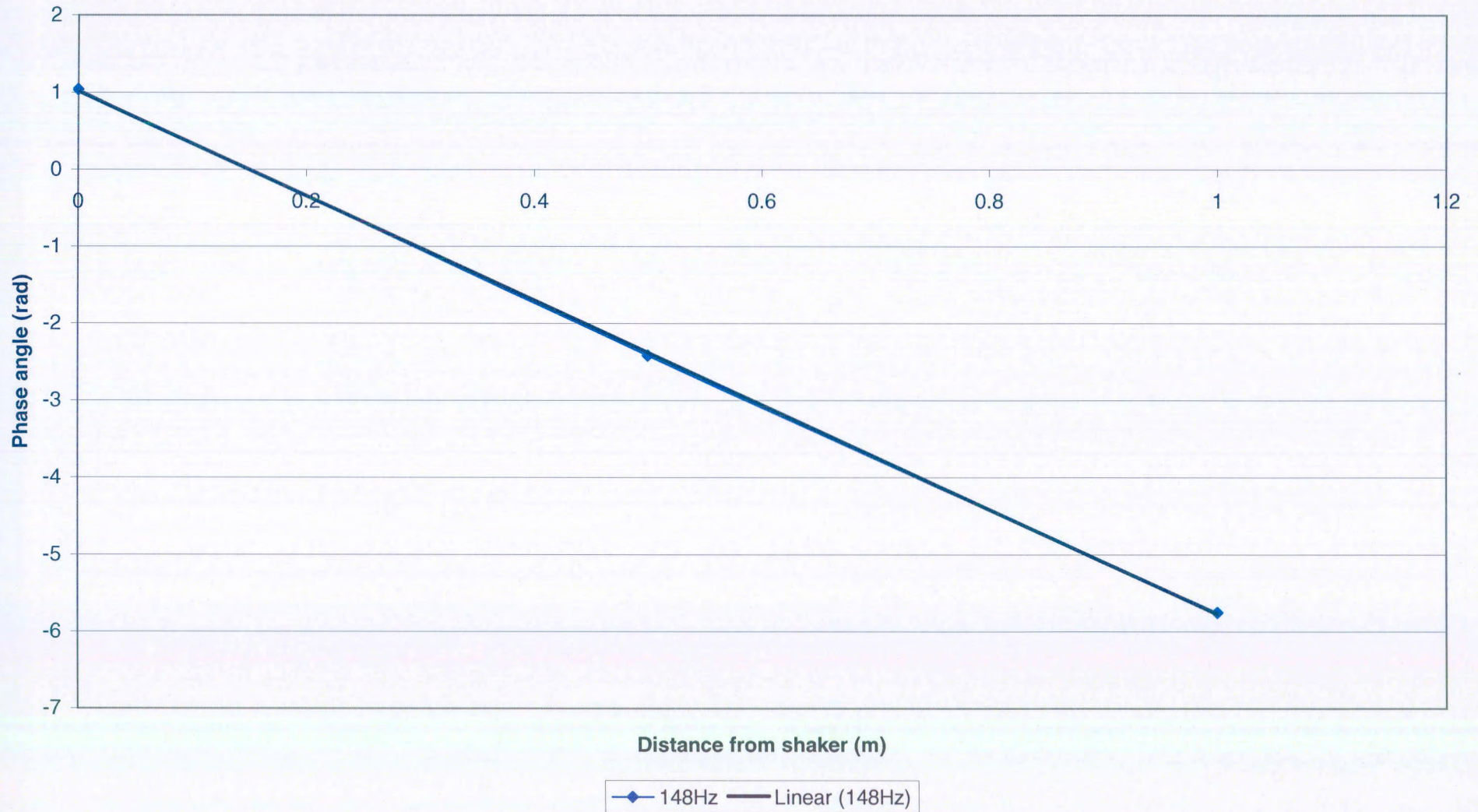


Frequency Spectrum (148 Hz)



Phase plot

$$y = -6.7894x + 1.0181$$
$$R^2 = 0.9999$$



### Frequency Spectrum (195 Hz)

$$y = -0.5843x + 2.1435$$
$$R^2 = 0.9901$$

