

376

Figure 15. Relative count rate vs stress, at 100 $^{\circ}\mathrm{C}$ and at $-80\ ^{\circ}\mathrm{C},$ separately.



Figure 16. Response of ferrite and of a low carbon steel.

JOURNAL OF NONDESTRUCTIVE TESTING

9. Where do we go from here?

94

In the actual problem of measuring a stress existing in a piece of metal, we have additional problems. We cannot simply follow the count rate vs. applied stress—the stress is already there. Further, the line width and center of the resonance may be changed by alloying conditions. Hopefully, even welds will be measureable, despite the migration of alloying elements. And, the measurement must utilize the one-sided technique, since specimens of interest are usually thicker than foils.

These unknown factors are tentatively treated as requiring additional data points—four will probably suffice. The sensitivity of count rate to geometry is simplified for flat surfaces by setting at the distance which gives a broad maximum in count rate. Curved surfaces will be more troublesome.

Acknowledgements

This feasibility study has been founded by the Metallurgy Division of the Office of Naval Research, Contract N 0014–69–C–0401.

REFERENCES

- Mössbauer, Rudolf L., A. Physik, 151, 124 (1958); Z. Naturforsch, 14A, 211 (1959).
- 2. Pound, R. V. and Rebka, G. A. Jr., Phys. Rev. Letters, 4, 337 (1960).
- 3. Maradudin, A. A. and Flinn, P. A., Phys. Rev., 126, 2059 (1962).
- Muir, A. H. Jr., Ando, K. J. and Coogan, H. M., "Mössbauer Effect Data Index," issue 3, North American Science Center, Thousand Oaks, California (1965).
- 5. Preston, R. S., Hanna, S. S. and Heberle, J., Phys. Rev., 128, 2207 (1962).
- 6. Kistner, O. C. and Sunyar, A. W., Phys. Rev. Letters, 4, 412 (1960).
- 7. Pound, R. V. and Rebka, G. A. Jr., Phys. Rev. Letters, 4, 274 (1960).
- 8. Josephson, B. D., Phys. Rev. Letters, 4, 341 (1960).
- 9. Cohen, M. M. and Reif, F., Solid State Physics, 5, 324 (1957) (Academic Press, New York, N.Y.).
- 10. Ruby, S. L. and Flinn, P. A., Rev. Mod. Phys., 36, 351 (1964).
- 11. Collins, R. L. and Travis, John C., "The Electric Field Gradient Tensor," to be published in the Third Mössbauer Methodology Symposium (1967).
- Pipkorn, D. N., Edge, C. K., DeBrunner, P., De Pasquali, G., Drickamer, H. G. and Frauenfelder, H., *Phys. Rev.*, 135, A1604 (1964).
- 13. Terrell, J. H. and Spijkerman, J. J., Applied Physics Letters, 13, 11 (1968).