may be judged by the degree to which the derivatives calculated from the smoothed points agree with Eq. (i). Examination of Fig. 8 shows that the first smoothing has a great effect on the value of the calculated derivatives, as the points obtained agree much closer to Eq. (i) than Eq. (vi). [Equation (vi) provides a good indication of the derivatives one would obtain numerically before any smoothing process was applied.] Examination of Fig. 9 shows that except for small λ's the values of $y''(\lambda)_2$ and $y''(\lambda)_3$ agree very well with Eq. (i), and that in general the agreement is a little better in the case of $y''(\lambda)_3$ than $y''(\lambda)_2$. The deviation from Eq. (i) for small λ's was due to a systematic error introduced by the smoothing process in this region since the actual second derivative is discontinuous at $t=0$, and the calculations give an approximation to a continuous function. The error in this case was not large, however, and certainly is not serious in the cannon problem because pressure equilibrium does not exist in the cannon chamber at times corresponding to this region. Except for small λ's Eq. (i) is very nearly the curve of best fit one could drawn through either the points $y''(\lambda)_2$ or $y''(\lambda)_3$. No actual numerical estimate can be made for the error in obtaining the derivatives for the cannon test, but the above problem indicates that the error was in all probability small.

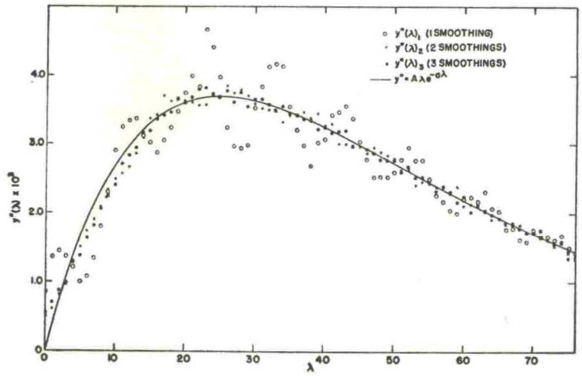

FIG. 9. Comparison of calculated second derivatives with analytical values.