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Erratum: “Vibrational impact of high-speed trains. I. Effect of track dynamics” [J. Acoust. Soc. Am. 100, 3121–3134 (1996)]

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In the above-mentioned paper, the transition from the calculated dynamic values of track deflection curves $w(\nu t)$ to the corresponding load forces $P(t)$ applied from sleepers to the ground at very high train speeds has been made using the earlier derived¹ quasi-static relationship $P(t) = T[2w(\nu t)/w_{\max}^{\text{st}}](d/x_0)$ —formula (5) of the paper. This led to a wrong conclusion that the approaching of the train speed to the critical track wave velocity will be associated with a decreased level of generated ground vibrations. In fact, the result is opposite: the level of generated vibrations will *increase* when train speeds approach the track wave critical velocity.

To provide the correct result, formula (5) should be re-written in a more general form valid for both quasi-static and dynamic regimes:

$$P(t) = T[2w(\nu t)/w_{\max}^{\text{st}}](d/x_0^{\text{st}}). \quad (5)$$

Here, $w_{\max}^{\text{st}}$ and x_0^{st} are, respectively, the maximum value of $w(\nu t)$ and the track deflection length, both being calculated in the quasi-static approximation. Derivation of (5) goes straightforward if we take into account that $P(t) = \alpha w(\nu t)\Delta d$, where Δd is the sleeper width and α is the constant of the Winkler foundation. Exclusion of α and Δd from this expression may be done by integrating Eq. (1) of the paper taking into consideration a quasi-static regime

(i.e., for $\partial^2 w / \partial t^2 = 0$) over the distance along the track x . The integration, which takes into account that load forces are transmitted to the ground through sleepers only, results in the formula $\alpha w_{\max}^{\text{st}} \Delta d N_{\text{eff}}^{\text{st}} = T$, where the quantity $N_{\text{eff}}^{\text{st}} = \pi/2\beta d = x_0^{\text{st}}/2d$ determined as a solution of Eq. (6) of the paper is the effective number of sleepers equalizing the quasi-static axle load T . Combined with the expression for $P(t)$, this gives the above written more general formula (5).

Since, for dynamic values of $w(\nu t)$, the factor $\delta = (1 - \nu^2/c_{\min}^2)^{1/2}$ is present in the denominator of the corrected formula (5) [and of the associated formula (10)], the forces $P(t)$ applied from sleepers to the ground (Fig. 3) will increase as the train speed approaches the critical track wave velocity. Therefore, in Figs. 6 and 11 of the paper and in the corresponding conclusion one will have the increase in levels of generated ground vibrations for train speeds approaching the critical track wave velocity, instead of the earlier predicted decrease. The corrected Figs. 3, 6, and 11 will be reproduced in detail in a forthcoming publication. Other formulas, figures, and conclusions of the paper remain unchanged.

¹V. V. Krylov, “Generation of ground vibrations by superfast trains,” *Appl. Acoust.* **44**, 149–164 (1995).