SEMINARIO – GRUPO DE MECÁNICA COMPUTACIONAL

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Evaluación de los efectos dinámicos en puentes ferroviarios de alta velocidad con luces pequeñas o medias

Due to the need to increasing train speed several existing short to medium span viaducts in the track Linz-Wels (Austria) were re-evaluated. In preliminary numerical calculations, considering conservatives values for the dynamic parameters, very high vertical accelerations were computed, up to 20 m/s^2 for several of them. Since the dynamic response depends on parameters that can be theoretically estimated, such as the correct natural frequencies, the structural damping and other sources of damping including the ballast, an experimental program was thus carried out in order to get a better estimation of the dynamic behaviour of the viaducts. Based on the results obtained from the field measurements, finite element models for the viaducts were developed. Since in this kind of structures it is difficult to predict the influence on the dynamic behaviour of several parameters (bearing supports, superstructure defined by the ballast track, and methodology used for the load modelling), the development of these models was a complicated task.

Different methodologies were applied to compute the response accelerations of the viaducts due to the passage of the trains: the moving loads and the interaction. To calculate the interaction between the train and the railway platform placed on the bridge deck the contact algorithm establish in software ADINA was used. Several algorithms, step-by-step direct time integration are used, namely the Newmark method, the Wilson θ method and the mode superposition method.

Railway track irregularities consist of a deviation of the inside edge of the rail from the ideal geometric rail contour and may occur even during the passage of the vehicle at a very low speed. Track irregularities can influence the dynamic behaviour of railways bridges and increase dynamic load effects. To investigate the influence of different irregularities on the dynamic behaviour of a medium bridge, random irregularities, continuous all over the rail and isolated irregularity were considered. The maximum response of the bridge, displacements and accelerations, at the mid span was calculated. For these calculations the dynamic model of the ballast track, present in the ERRI studies, was used and the response of the ballast was also analysed.

Resumen CV de C. Rigueiro

Ing. Civil Coimbra (1992), realiza el doctorado (Coimbra, 2009) sobre dinámica de estructuras ferroviarias. Ha desarrollado trabajos de investigación sobre dinámica de pasarelas peatonales y puentes.