6th European Conference on Computational Mechanics (Solids, Structures and Coupled Problems) (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
June 11- 15, 2018, Glasgow, UK

COMPUTATIONAL MODELLING OF BEAMS ON FOUNDATION WITH APPLICATION TO RAIL TRACKS

A. PINTO DA COSTA AND F.M.F. SIMÕES

CERIS, Instituto Superior Técnico, Universidade de Lisboa
Av. Rovisco Pais, 1049-001 Lisboa, Portugal
{antonio.pinto.da.costa,fernando.simoes}@tecnico.ulisboa.pt

Key words: Vehicle-infrastructure interaction, Railway engineering.

ABSTRACT

This minisymposium is devoted to nonlinear dynamic analyses of beams on foundations under moving masses, moving loads or vehicles and its application to railway track modelling, design and rehabilitation, both from the analytical and the computational points of view. A good performance with minimal maintenance of railway tracks has a decisively positive impact on the economic exploration of existing high-speed lines and on the possibility of extension of the present high-speed network. Moreover, the competitiveness of high-speed trains with respect to airplane for travels longer than 900 km depends on the increase of the train average velocity. However, it is well known that for high velocity ranges the oscillation amplitudes of the vehicle-rail-foundation system may become very large, thus endangering the structural and passengers' safety: the understanding and mitigation of such effects are relevant for the expansion of the high-speed lines network. On the other hand, the strongly nonlinear behavior of some of the components of the vehicle-rail-foundation system, poses complex and interesting challenges to researchers, engineers and railway companies.

We intend to gather active researchers from the widest possible range of topics with a strong emphasis on the development or use of computational and/or analytical methods. A non-exhaustive set of topics adequate to be presented is: beam and foundation models, vehicle-beam interaction models, network of forces in the ballast bed, sleepers and rail pads, consideration of railhead irregularities, damping strategies, three dimensional modelling, wave propagation, computation of critical velocities, rolling contact, related frictional and unilateral contact aspects, the effects of braking on a railway track, seismic interaction, derailment and its catastrophic consequences, algorithms and numerical methods. Presentations on realistic models for complex systems comprising large numbers of degrees of freedom and presentations more focused on models and strategies to simplify the analyses of these large systems are equally welcome.

We aim at giving an account of the modern developments in the field of railway track modelling, design and rehabilitation and of the numerical or analytical methods to solve them. We would like to contribute to a better insight on the real behavior of railway tracks and vehicles.