

# REFERENCES

- Ahlbeck, D.R. and Hadden, J.A. 1985. Measurement and prediction of impact loads from worn railroad wheel and rail surface profiles. *Journal of Engineering* for Industry. Transactions of the ASME, May 1985.
- Ahlbeck, D.R. 1995. Effects of track dynamic impedance on vehicle-track interactions. Interaction of railway vehicles with the track and its substructure. Edited by Knothe, K., Grassie, S.L. and Elkins, J.A.: Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.
- Anon. 1961. Automatische Auswertmethode zur Bestimmung der Wagenlaufgüte. Glasers Annalen, December 1961.
- Becker, K. 1978. Evaluation of the ride quality in vehicles. *High Speed Ground Transportation Journal*. Volume 12, No. 3.
- Bendat, J.S. and Piersol, A.G. 1971. Random data: Analysis and measurement procedures. Wiley Interscience.
- Berg, H., Gößling, G. and Zück, H. 1996. Radsatzwelle und Radscheibe die richtige Kombination zur Messung der Kräfte zwischen Rad und Schiene. ZEV + DET Glasers Annalen 120. Nr 2, February 1996.
- Bhatti, M.H. and Garg, V.K. 1984. A review of railway vehicle performance and design criteria. *International Journal of Vehicle Design*. Volume 5, Nos 1/2.
- Botwright, K. 1979. Interaction of vehicle and track. *Railway Engineer Journal*. IMechE, January/February 1979.
- Chang, C.S., Adegoke, C.W. and Selig, E.T. 1980. GEOTRACK model for railroad track performance. *Journal of the Geotechnical Engineering Division*. Proceedings of the American Society of Civil Engineers. Volume 106, No. GT11, November 1980.



- Chrismer, S. and Selig, E.T. 1993. Computer model for ballast maintenance planning. Proceedings of the 5th International Heavy Haul Conference. Beijing, China, June 1993.
- Clark, R.A.P. 1984. Rail corrugations recent theories. *Track Technology*. Thomas Teleford Ltd., London.
- Cohen, A. and Hutchens, W.A. 1970. Methods for the reconstruction of rail geometry from mid-chord offset data. *ASME*, 70-Tran-24.
- Cox, S.J. and Grassie, S.L. 1986. Understanding dynamics as an aid to developing track. Proceedings of the 3rd International Heavy Haul Conference. Vancouver, B.C., Canada, October 1986.
- Dahlberg, T., Akesson, B. and Westberg, S. 1993. Modelling the dynamic interaction between train and track. *Railway Gazette International*. June 1993.
- Dong, R.G., Sankar, S. and Dukkipati, R.V. 1994. A finite element model of railway track and its application to the wheel flat problem. *Proceedings Institution Mechanical Engineers*. Volume 208, IMechE.
- Ebersöhn, W., Trevizo, M.C. and Selig, E.T. 1993. Effect of low track modulus on track performance. *Proceedings of the 5th International Heavy Haul Conference*. Beijing, China, June 1993.
- Ebersöhn, W. and Selig, E.T. 1994. Track modulus measurement on a heavy haul line. Paper No 940538. Transportation Research Board. 73rd Annual Meeting, Washington, D.C., January 1994.
- Ebersöhn, W. 1995. Substructure Influence on Track Maintenance Requirements. Ph.D. Dissertation, Department of Civil and Environmental Engineering, University of Massachusetts at Amherst.
- Eisenmann, J. 1972. Germans gain a better understanding of track structure. Railway Gazette International. August 1972.
- Eisenmann, J., Leykauf, G. and Mattner, L. 1993. Deflection and settlement behaviour of ballast. Proceedings of the 5th International Heavy Haul Conference. Beijing, China, June 1993.
- Esveld, C. 1989. Modern Railway Track. MRT-Productions, Duisburg.
- Fastenrath, F. 1977. Die Eisenbahnschiene. Verlag von Wilhelm Ernst & Sohn.



- Ford, R. 1995. Differential ballast settlement, and consequent undulations in track, caused by vehicle-track interaction. Interaction of railway vehicles with the track and its substructure. Edited by Knothe, K., Grassie, S.L. and Elkins, J.A.: Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.
- Frederich, F. and Hecht, M. 1986. Erfassung der Gleislage auf OPNV-Strecken. Fortschritt-Berichte VDI Reihe 12: Verkehrstechnik /Fahrzeugtechnik. Nr. 64, VDI Verlag, Düsseldorf.
- Frederick, C.O. and Round, D.J. 1984. Vertical track loading. Track Technology. Thomas Teleford Ltd., London.
- Fröhling, R.D. 1994. Random Data Analysis (Random Data Analysis Program (RDAP (Version 1.0 (b)))). June 1994.
- Fröhling, R.D. 1995. Measurement, interpretation and classification of South African track geometry. Interaction of railway vehicles with the track and its substructure. Edited by Knothe, K., Grassie, S.L. and Elkins, J.A.: Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.
- Fröhling, R.D., Scheffel, H. and Ebersöhn, W. 1996a. The vertical dynamic response of a rail vehicle caused by track stiffness variations along the track. The dynamics of vehicles on roads and on tracks: Proceedings of the 14th IAVSD Symposium, Ann Arbor, Michigan, USA, August 1995, Edited by Segel L., Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 25.
- Fröhling, R.D., Howard, M.A. and Kayser, C.R. 1996b. Experimental and theoretical investigation into load sensitive damping in three-piece freight car bogies. Proceedings of the *Conference on Freight Car Trucks/Bogies* organised by the International Heavy Haul Association, Montreal, Canada, June 1996.
- Fryba, L. 1987. Dynamic interaction of vehicles with tracks and roads. Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 16.



- Garg, V. K. and Dukkipati, R. V. 1984. Dynamics of railway vehicle systems. Acedemic Press.
- Girardi, L. and Recchia, P. 1991. Use of a computational model for assessing dynamical behaviour of a railway structure. *Proceedings of the 12th IAVSD Symposium*, Lyon.
- **Grassie, S.L.** 1980. *The corrugation of railway track*. Ph.D. Dissertation, University of Cambridge.
- Grassie, S.L., Gregory, R.W., Harrison, D. and Johnson, K.L. 1982. The dynamic response of railway track to high frequency vertical excitation. *Journal Mechanical Engineering Science*. Volume 24, No.2.
- Grassie, S.L. and Cox, S.J. 1985. The dynamic response of railway track with unsupported sleepers. *Proceedings Institute Mechanical Engineers*. Volume 199, No D2, IMechE.
- Grassie, S.L. 1989. Behaviour in track of concrete sleepers with resilient railpads. Proceedings Institute Mechanical Engineers. Volume 203, IMechE.
- Grassie, S.L. 1993. Dynamic models of the track and their uses. Kalker J.J. et al. (eds.), Rail Quality and Maintenance for Modern Railway Operation, Kluwer Academic Publishers.
- Guins, S.G. 1980. First order dynamic response of freight car to track irregularities. Journal of Engineering for Industry. Transactions of the ASME. Volume 102, August 1980.
- Hecht, M. 1988. Gleislageuntersuchung aus fahrzeug- und oberbautechnischer Sicht: Entwicklung eines universellen dynamischen Meßverfahrens. Fortschritt-Berichte VDI Reihe 12: Verkehrstechnik / Fahrzeugtechnik. Nr. 104, VDI Verlag Düsseldorf.
- Hempelmann, K. 1994. Short pitch corrugations on railway rails A linear model for prediction. Fortschritts-Berichte VDI Reihe 12: Verkehrstechnik / Fahrzeugtechnik. Nr. 231, VDI Verlag, Düsseldorf.
- Hetényi, M. 1946. Beams on elastic foundation. University of Michigan Press, Ann Arbor.



- Hettler, A. 1984. Bleibende Setzung des Schotteroberbaus. ETR Eisenbahntechnische Rundschau 33, Volume 11.
- Howard, M.A., Fröhling, R.D. and Kayser, C.R. 1997. Validation, simplification and application of a computer model of load sensitive damping in three piece bogies. *Proceedings of the 6th International Heavy Haul Conference*. Cape Town, April 1997.
- Hunt, H.E.M. 1996. Track settlement adjacent to bridge abutments. Paper presented at the Fourth Vehicle/Infrastructure Interaction Conference. San Diego, California, USA, June 1996.
- Ilias,H. and Müller S. 1994. A discrete-continuous track-model for wheelsets rolling over short wavelength sinusoidal rail irregularities. The dynamics of vehicles on roads and on tracks. Edited by Shen Z., Swets & Zeitlinger. Proceedings of the 13th IAVSD Symposium. Chengdu, P.R. China, August 1993.
- International Standard ISO 2631/1. 1985. Evaluation of human exposure to whole-body vibration, Part 1: General requirements.
- International Union of Railways, Office for Research and Experiments, Question C 116. 1977. Interaction between vehicles and track, Report No. 8, Methods for assessing the comfort quality of passenger vehicles. Utrecht, Holland, April 1977.
- International Union of Railways, Office for Research and Experiments, Question D71 1965. Stresses in the track, ballast and formation as a result of rolling loads, Stresses in rails, Part 2: Calibration and measuring procedures. Report No. 1, Utrecht, Holland.
- International Union of Railways, Office for Research and Experiments, Question D 71 1970. Stresses in the rails, the ballast and in the formation resulting from traffic loads, Report No. 10, Deformation properties of ballast (Laboratory and track tests). Volume 1 - Text and Appendices & Volume 2 -Tables and Figures, Utrecht, Holland, April 1970.



- International Union of Railways, Office for Research and Experiments, Question D 117 1974. Optimum adaption of the conventional track to future traffic, Report No. 5, Deformation of railway ballast under repeated loading (Triaxial Tests). Utrecht, Holand, October 1974.
- International Union of Railways, Office for Research and Experiments, Question D 161 1987. Dynamic vehicle/track interaction phenomena, from the point of view of track maintenance, Report 1: General conditions for the study of the evolution of track geometry based on historical information. Utrecht, Holland, April 1987.
- Jeffs, T. 1994. The influence of the critical train speed on vertical wheel-rail forces. Minor Thesis, Department of Mechanical Engineering, Monash University, Australia, February 1994.
- Jenkins, H.H., Stephenson, J.E., Clayton, G.A., Morland, G.W. and Lyon, D. 1974. The effect of track and vehicle parameters on wheel/rail vertical dynamic forces. *Railway Engineering Journal*. January 1974.
- Kerr, A.D. 1964. Elastic and viscoelastic foundation models. Journal of Applied Mechanics. Transactions of the ASME. September 1964.
- Knothe, K. and Ripke, B. 1989. The effects of the parameters of wheelset, track and running conditions on the growth rate of rail corrugations. The dynamics of vehicles on roads and on tracks. Edited by Anderson R.J., Swets & Zeitlinger. Proceedings of the 11th IAVSD Symposium, Kingston, Ontario.
- Knothe, K. and Grassie, S.L. 1993. Modelling of railway track and vehicle/track interaction at high frequencies. Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 22.
- Knothe, K., Grassie, S.L. and Elkins, J.A. 1995. Interaction of railway vehicles with the track and its substructure. Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.
- Koffman, J.L. 1959. The effect of suspension design on rail stresses. *The Railway Gazette*. March 1959.



- Kortüm, W. and Sharp, R. 1993. Multibody computer codes in vehicle system dynamics. Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 22.
- Lane, G.S. 1982. The effects of track and traffic parameters on the development of track vertical roughness. Proceedings of the 2nd International Heavy Haul Conference. Colorado Springs, Colorado, September 1982.
- Leshchinsky, D., Choros, J. and Reinschmidt, A.J. 1982. A simplified methodology to evaluate the effect of heavier axle loads on track substructure performance. *Proceedings of the 2nd International Heavy Haul Conference*. Colorado Springs, Colorado, September 1982.
- Levy, S. and Wilkinson, J.P.D. 1976. The component element method in dynamics. McGraw-Hill.
- Li, D. and Selig, E.T. 1995. Wheel/rail dynamic interaction: Track substructure perspective. Interaction of railway vehicles with the track and its substructure. Edited by Knothe, K., Grassie, S.L. and Elkins, J.A.: Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.
- Lombard, P.C. 1978. Track structure Optimisation and design. Proceedings of the Heavy Haul Railways Conference. Perth, Australia, September 1978.
- Luo, R.K., Gabbitas, B.L. and Brickle, B.V. 1994. Fatigue life evaluation of a railway vehicle bogie using an integrated dynamic simulation. *Proceedings of the Institute of Mechanical Engineers*. Volume 208, Part F: Journal of Rail and Rapid Transit, IMechE.
- Maree, J.S. 1989. Evaluation of track structure problems on the coal line. Proceedings of the 4th International Heavy Haul Railway Conference. Brisbane, September 1989.
- Maree, J.S. 1993. Aspects of resilient rail pads. Proceedings of the 5th International Heavy Haul Conference. Beijing, China, June 1993.



- Mauer, L. 1995. Determination of track irregularities and stiffness parameters with inverse transfer functions of track recording vehicles. Interaction of railway vehicles with the track and its substructure. Edited by Knothe, K., Grassie, S.L. and Elkins, J.A.: Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.
- Moravčík, M. 1995. Response of railway track on nonlinear discrete supports. Interaction of railway vehicles with the track and its substructure. Edited by Knothe, K., Grassie, S.L. and Elkins, J.A.: Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.
- Newland, D.E. and Cassidy, K.J. 1975. Some fundamental design considerations for railway vehicles. *REJ*. March 1975.
- Nielsen, J.C.O. 1994. Dynamic interaction between wheel and track A parametric search towards an optimal design of rail structures. Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 23.
- Ostermeyer, M., Berg, H. and Zück, H.H. 1980. Der heutige Entwicklungsstand der Meßmethode "Radsatzwellenverfahren" zur Bestimmung der Kräfte zwischen Rad und Schiene. *Glasers Annalen*.
- Parsons, K. C. and Whitham, E. M. 1979. Six axis vehicle vibration and its effects on comfort. *Ergonomics*. Volume 22, No. 2.
- Permanent Way Instructions. 1984. South African Transport Services.
- Radford, R.W. 1977. Wheel/Rail vertical forces in high speed railway operation. Journal of Engineering for Industry. Transactions of the ASME. November 1977.
- Riessberger, K. and Wenty, R. 1993. Track quality Key to load bearing capacity and efficient maintenance. Proceedings of the 5th International Heavy Haul Conference. Beijing, China, June 1993.
- Sato, Y. 1995. Japanese studies on deterioration of ballasted track. Interaction of railway vehicles with the track and its substructure. Edited by Knothe, K., Grassie, S.L. and Elkins, J.A.: Swets & Zeitlinger. Supplement to: Vehicle System Dynamics: International Journal of Vehicle Mechanics and Mobility, Volume 24.



Schielen, W. 1990. Multibody Systems Handbook. Springer-Verlag.

- Schwab, C. A. and Mauer, L. 1989. An interactive track/train dynamics model for investigating system limits in high speed track. The dynamics of vehicles on roads and on tracks. Edited by Anderson R.J., Swets & Zeitlinger. Proceedings of the 11th IAVSD Symposium, Kingston, Ontario.
- Selig, E.T. and Alva-Hurtado, J.E. 1982. Predicting effects of repeated wheel loading on track settlement. Proceedings of the 2nd International Heavy Haul Conference. Colorado Springs, Colorado, September 1982.
- Selig, E.T. and Waters, J.M. 1994. Track geotechnology and substructure management. Thomas Telford.
- Shenton, M.J. 1985. Ballast deformation and track deterioration. Track Technology. Thomas Teleford Ltd., London.
- Stewart, H.E. and Selig, E.T. 1982. Prediction of track settlement under traffic loading. *Proceedings of the 2nd International Heavy Haul Conference*. Colorado Springs, Colorado, September 1982.
- Talbot, A.N. 1980. Stresses in railroad track The Talbot reports. The reports presented for the AREA bulletins of the Special Committee on Stress in Railroad Track, 1918 to 1940, American Railway Engineering Association.
- Timoshenko, S. 1926. Methods of analysis of statical and dynamical stresses in rail. Proceedings of the Second International Congress for Applied Mechanics. Zürich.
- Uetake, Y. 1980. Standards of riding quality in foreign railways. Permanent Way. Volume 22, No. 1, March 1980.
- Urban, C.L. 1991a. Suspension wear and truck performance: A case study. AAR Report R-785, August 1991.
- Urban, C.L. 1991b. 125-ton freight car vertical performance: A case study. AAR Report R-792, October 1991.
- Wangqing, W., Geming, Z., Kaiming, Z. and Lin, L. 1997. Development of inspection car for measuring railway track elasticity. *Proceedings of the 6th International Heavy Haul Conference*. Cape Town, April 1997.



- Winkler, E. 1867. Die Lehre von der Elastizität und Festigkeit. Prag: Verlag H. Dominicus.
- Winkler, E. 1875. Der Eisenbahnoberbau (3rd edition), Prag: Verlag H. Dominikus.
- Yabuto, K., Hidaka, K. and Fukushima, N. 1981. Influence of suspension friction on riding comfort. The dynamics of vehicles on roads and on tracks. Edited by Shen Z., Swets & Zeitlinger. *Proceedings of the 7th IAVSD-Symposium*. Cambridge University, Cambridge, UK.
- Yamazaki, M. and Hara, S. 1980. JNR's standards for riding comfort. Permanent Way. Volume 22, No. 1, March 1980.
- Zeilhofer, M., Sühsmuth, G. and Piwenitzky, G. 1972. Ermittelung der Kräfte zwischen Rad und Schiene aus den Biegedehnungen der Radsatzwelle. *Glasers Annalen, ZEV*, Jahrgang 96, Heft 12.
- Zhai, W. and Sun, X. 1993. A detailed model for investigating vertical interaction between railway vehicle and track. The dynamics of vehicles on roads and on tracks. Edited by Shen Z., Swets & Zeitlinger. *Proceedings of the 13th IAVSD Symposium*. Chengdu, P.R. China, August 1993.