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Karima Khusnutdinova* (K.Khusnutdinova@lboro.ac.uk), Department of Mathematical Sciences, Loughborough University, Loughborough, LE11 3TU, England, and **Galina Dreiden, Alexander Samsonov** and **Irina Semenova**. *On classical and radiating strain solitary waves in layered waveguides.*

We discuss our recent analytical, numerical and experimental studies of long nonlinear waves in layered elastic waveguides. The emphasis is on classical and radiating solitary waves. In particular, we study the scattering of a long longitudinal strain solitary wave in a split, symmetric layered bar, made of a hyperelastic (Murnaghan) material. The problem is reduced to finding a solution of a Boussinesq-type equation with piecewise-constant coefficients, subject to some continuity conditions across the jump. The developed approach is based on matching two asymptotic multiple-scale expansions, integrability theory of the leading order KdV equations by the Inverse Scattering Transform and some natural radiation conditions. We show that splitting of the layered structure induces a generation of a train of secondary solitary waves from a single incident soliton and, thus, can be used to detect the defect. The theory is supported by experiments, performed in the Ioffe Institute in St. Petersburg (Russia). Possible applications of the described phenomenon include introscopy of layered structures and seismology. (Received September 14, 2010)