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Letter to the Editor

Comments on “Marine tether dynamics: retrieval and deployment from a heaving platform” By R.E. Baddour and W. Raman-Nair

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The authors are to be congratulated for their excellent proposal and solution of the resulting mathematical model of the tether management system of a winch module in a marine environment (Baddour and Raman - Nair (2002)). The effects of the heaving platform on the motions of the drum, tether and attached mass are analyzed in conjunction with the longitudinal one – dimensional vibrations of the tether taking into account the tether extensibility when dealing with the operation threshold of the system.

The writers also feel that some additional mathematical considerations are in order with regards to the use of the eigenfunctions, see the authors’ equation (92):

$$\phi_r(x) = \sin\left(\frac{\beta_r x'}{L_0}\right), r = 1, 2, \dots$$

where $x' = x - (L - r\theta)$,

$$\text{and } \beta_r \tan \beta_r = \frac{\rho L_0}{m + m_a}$$

The use of the eigenfunctions defined in (92) constitutes a rather particular subject in the theory of Fourier series: the treatment of non harmonic Fourier developments since the eigenfunctions associated with these systems are not orthogonal with respect to the Lebesgue measure (Benedek et al., 1974).

Pioneering work in this respect was performed by S. Timoshenko early in the 20th century who studied the longitudinal vibrations of a fixed bar with a concentrated mass at the free end when the initial deformation of the rod is prescribed (Timoshenko and Young, 1955).

Prescott (1924) analysed the case of a cable – like system suddenly stopped at one end and extensive numerical results were performed by Laura et al. (1974). The effect of a shock – absorbing device was also studied (Laura et al., 1974).

Mayes (1975) showed that by introducing the Dirac delta function the analytical determinations are greatly simplified (see also Rossit (1995)). Additional interesting work in this area was performed by Jacquot (1976)

Problems of this type also arise in the treatment of diffusion type - problems.

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