Elliptic integral solutions of variable-arc-length elastica under an inclined follower force

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Source: ZEITSCHRIFT FUR ANGEWANDTE MATHEMATIK UND MECHANIK **Volume:** 84 **Issue:** 1 **Pages:** 29-38 **DOI:** 10.1002/zamm.200410076 **Published:** 2004

Abstract: This paper presents exact closed-formed solutions using elliptic integrals for large deflection analysis of elastica of a beam with variable arc-length subjected to an inclined follower force. The beam is hinged at end but slides freely over the support at the other end. In the undeformed state, the inclined follower force applied at any distance from the hinged end making an angle gamma with respect to vertical axis while in the deformed state its direction remains at an angle gamma from the normal to the beam axis. The set of nonlinear equations is obtained from the boundary conditions, and solved iteratively for the solutions. The effect of the direction and the position of the follower force on the beam bending behaviour is demonstrated. Comparisons of equilibrium configurations of the beam under non-follower force and follower force are also given. (C) 2004 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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