# Size-Dependent Dynamic Analysis of Timoshenko Micro Beam using the Finite Element Method


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## ABSTRACT

Micro beams have been widely used in the last decades, as components of MEMS (Micro Electro Mechanical Systems) and NEMS (Nano Electro Mechanical Systems). In the present work, a finite element formulation is developed for Timoshenko micro beams, taking into account the size-dependent effects. For this purpose the modified couple stress theory is used [1]. The modified couple stress theory takes advantage in simplicity, since it reduces the additional elasticity constants to only one [2], it is the length scale parameter. A dynamic study is carried out, considering the material length scale effects. The results are compared with those obtained by the classical elasticity theory. The first natural frequencies and the corresponding modal shapes of beams with different boundary conditions are obtained and compared with available results in the technical literature.


## REFERENCES


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