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Mathematical Analysis of a Piezoelectric Beam Model in Contact with a Charged Foundation

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Abstract: We study a model for an elastic piezoelectric beam which may enter in contact with a charged obstacle. The normal pressure follows a normal compliance contact condition and therefore is related to the interpenetration of surface asperities. When the contact happens, there is a surface current density acting on the beam, which is not a dielectric. As a matter of fact the beam equation is coupled with the one dimensional piezoelectricity system of equations recently obtained in [1]. We show that the model proposed is stable and has a unique weak solution. We also provide numerical simulations.

References

[1] J. Viaño, J. Figueiredo, C. Ribeiro and Á. Rodríguez-Arós, A model for bending and stretching of piezoelectric rods obtained by asymptotic analysis, *Zeitschrift fr angewandte Mathematik und Physik*, 2014, doi=10.1007/s00033-014-0438-1.