BUCKLING OF A TAPERED COLUMN UNDER ITS OWN WEIGHT. (LECTURE 2)

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I shall continue the study of the nonlinear Sturm-Liouville problem presented in Lecture 1, concentrating now on issues related to bifurcation. The aim is to discuss the set of all solutions of the problem, not just the minimizers of the energy. It turns out that, at critical tapering, the problem is no longer differentiable in the usual sense of Fréchet. However, it is still differentiable in the sense of Hadamard and this enables one to establish bifurcation phenomena which cannot occur in the classical setting. In passing I shall summarize some recent general results, by Gilles Evéquoz and myself, about bifurcation for nonlinear eigenvalue problems that are only Hadamard differentiable.

Finally, if time permits, I shall outline what is known so far about global properties of the set of solutions in the case of critical tapering. This covers work done in collaboration with Grégory Vuillaume.