In this work, nonlinear effects in MEMS transducers are analyzed and investigated. Specific solutions are proposed for either omitting the nonlinear effects directly, or canceling them out by intentional tailoring of other nonlinear effects. These design strategies are shown to yield transducers with superior functionality relative to the state-of-the-art.

This research has yielded several innovations in MEMS transducers of which two will be presented in detail. In the first part I will present a prevalent MEMS suspension and its 30 year old misleading ambiguity and an innovative solution will be introduced. In the second part I will present in detail a first of a kind classic parametric MEMS resonator. I will demonstrate its superior performance and show how this type of parametric excitation may open new opportunities for sensing.

The presentation is also intended for those who may not have substantial knowledge on MEMS or nonlinear dynamics.