Electronics and Mechanics

The following section will investigate the common ground and differences between electronics and mechanics and the associated models. For this purpose the modelling of the two domains will be considered on the level of an abstraction, see Figure. On the lowest level we find the consideration of electrical and magnetic fields and of the mechanical continuum. In electronics such considerations are required exclusively for the design of components, e.g. transistors, and this approach is known as device simulation. In the present context, however, we are interested in systems and therefore this type of simulation can be disregarded. Above this we find circuit simulation, which considers net lists of electronic components. In digital circuits we can convert continuous voltage levels into discrete values, such as 0 and 1, thereby significantly accelerating the simulation. Using digital electronics we can build processors on which software runs, which can itself act as an abstraction level. In mechanics, on the other hand, it has hitherto
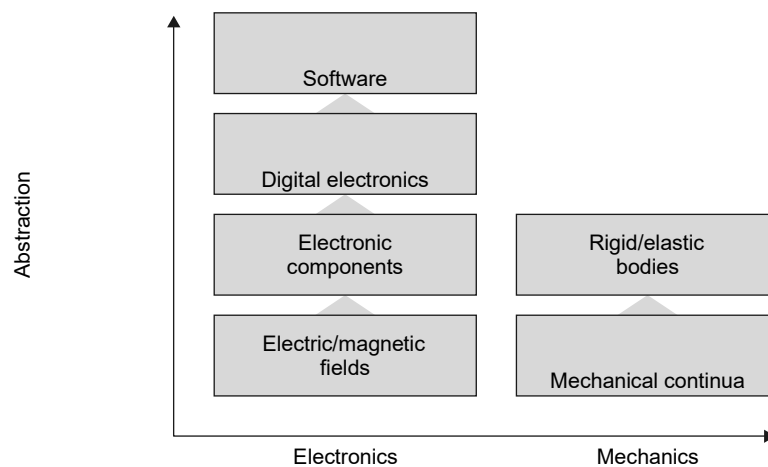

Figure Levels of abstraction for electronic and mechanical models

only been possible to differentiate between two levels of abstraction, the continuum level and the level of multibody systems in which rigid and elastic bodies are each considered as a unit. In particular, we cannot neglect the continuum level for the consideration of systems since an electro-mechanical transformation, e.g. sensors and actuators, occasionally cannot be abstracted to the multibody level. The demonstrators from the chapter on micromechatronics are a good example of this.