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Sommario/riassunto	Designing complex integrated circuits relies heavily on mathematical methods and calls for suitable simulation and optimization tools. The current design approach involves simulations and optimizations in different physical domains (device, circuit, thermal, electromagnetic) and in a range of electrical engineering disciplines (logic, timing, power, crosstalk, signal integrity, system functionality). COMSON was a Marie Curie Research Training Network created to meet these new scientific and training challenges by (a) developing new descriptive models that take these mutual dependencies into account, (b) combining these models with existing circuit descriptions in new simulation strategies, and (c) developing new optimization techniques that will accommodate new designs. The book presents the main project results in the fields of PDAE modeling and simulation, model order reduction techniques and optimization, based on merging the know-how of three major European semiconductor companies with the combined expertise of university groups specialized in developing suitable mathematical models, numerical schemes and e-learning facilities. In addition, a common Demonstrator Platform for testing mathematical methods and approaches was created to assess whether they are capable of addressing the industry's problems, and to educate young researchers by providing hands-on experience with state-of-the-art problems. .