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Shape and material effects in Casimir forces THORSTEN EMIG, LPTMS, CNRS and Universite Paris-Sud, UMR8626, 91405 Orsay, France, GIUSEPPE BIMONTE, Dipartimento di Scienze Fisiche, Università di Napoli Federico II, Via Cintia, 80126 Napoli, Italy, MOHAMMAD MAGHREBI, Physics Department, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, NOAH GRAHAM, Department of Physics, Middlebury College Middlebury, VT 05753, ROBERT JAFFE, Center for Theoretical Physics, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, MEHRAN KARDAR, Physics Department, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139 — Casimir forces depend non-trivially on shape and material properties. Using ideas from electromagnetic scattering theory and conformal mappings, we have derived a number of novel analytical and numerical results for Casimir interactions. We shall give a brief overview of the general approach and present explicit results for some generic examples, including short- and long-distance expansions, interaction of perfect conductors with sharp edges and tips, and exact solutions in two and three dimensions. The predictions are compared to recent experiments.

Robert Jaffe
Center for Theoretical Physics, Massachusetts Institute of Technology,
77 Massachusetts Avenue, Cambridge, MA 02139

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