Eisenstein functions within a mathematical analysis of composite materials with imperfect interface conditions

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We analyse mixed boundary value problems for the Laplace equation with imperfect contact conditions, serving as models for a composite material structure. Based on Eisenstein functions and a functional analysis approach, solutions to those problems are derived. On the basis of these solutions, we obtain different material characteristics (such as temperature, flux and the effective conductivity) for a 2D composite material model with circular disjoint inclusions. In the final part of the talk we will consider some concrete examples to illustrate the obtained solutions. This is a joint work with D. Kapanadze and E. Pesetskaya and, in part, based on [CKP15a, CKP15b, CP16].

References

[CKP15a] L.P. Castro, D. Kapanadze and E. Pesetskaya: Effective conductivity of a composite material with stiff imperfect contact conditions, *Mathematical Methods in Applied Sciences* **38**(18) (2015), 4638–4649.

[CKP15b] L.P. Castro, D. Kapanadze and E. Pesetskaya: A heat conduction problem of 2D unbounded composites with imperfect contact conditions, *ZAMM - Journal of Applied Mathematics and Mechanics (Zeitschrift für Angewandte Mathematik und Mechanik)* **95**(9) (2015), 952–965.

[CP16] L.P. Castro, E. Pesetskaya: Properties of a composite material with mixed imperfect contact conditions, *Mathematical Modelling and Analysis* **21**(3) (2016), 283–303.