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Advances in Wiener–Hopf type techniques

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Editorial



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Special issue: advances in Wiener–Hopf type techniques: theory and applications. *Proc. R. Soc. A* **479**: 20230210.

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Special issue: advances in Wiener–Hopf type techniques: theory and applications

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This collection of papers was inspired by the Isaac Newton Institute programme ‘Bringing pure and applied analysis together via the Wiener–Hopf technique, its generalizations and applications’. It is now almost exactly 100 years since Norbert Wiener and Eberhard Hopf started their career in mathematics and 92 years since the Wiener–Hopf method was discovered. This research direction has stood the test of time and is still an active research area, which recently received a significant boost from new advances in matrix factorization and metamaterials. There are a number of research topics covered in this special feature. Firstly, there is a review paper aiming to systematize some of the achievements. This review highlights the main directions in the method development and discusses major challenges that researchers meet in applying the method in various areas and disciplines:

One contribution to a special feature ‘Advances in Wiener–Hopf type techniques: theory and applications’ organized by Gennady Mishuris and Anastasia Kisil.

Next there are contributions in the area of pure mathematics directed into the development of novel effective methods for factorization of matrix functions:

Victor Adukov

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0012>

Lasha Ephremidze

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0027>

Victor Adukov

<https://royalsocietypublishing.org/doi/10.1098/rspa.2021.0941>

A large bulk of this issue concerns applications of the Wiener–Hopf method in the analysis of the propagation of acoustic, electromagnetic and elastic waves in complex media with defects and metamaterials:

Andrea Nobili

<https://royalsocietypublishing.org/doi/10.1098/rspa.2019.0822>

Matthew Colbrook

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0184>

Basant Lal Sharma

<https://royalsocietypublishing.org/doi/10.1098/rspa.2019.0866>

John Willis

<https://royalsocietypublishing.org/doi/10.1098/rspa.2019.0811>

Michael Smith

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0360>

Ian Thompson

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0648>

Guido Lombardi

<https://royalsocietypublishing.org/doi/10.1098/rspa.2021.0040>

Guido Lombardi

<https://royalsocietypublishing.org/doi/10.1098/rspa.2021.0624>

Finally the issue contains papers that concern boundary value problems with mixed boundary conditions of the Wiener–Hopf type. Classical approaches as well as new techniques like machine learning and developments of the multidimensional Wiener–Hopf method are applied to these problems.

Yuri Antipov

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0240>

Andrey Korolkov

<https://royalsocietypublishing.org/doi/10.1098/rspa.2021.0530>

Mikhail Lyalinov

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0179>

Victor Adukov

<https://royalsocietypublishing.org/doi/10.1098/rspa.2022.0144>

Xun Huang

<https://royalsocietypublishing.org/doi/10.1098/rspa.2019.0846>

Raphael Assier

<https://royalsocietypublishing.org/doi/10.1098/rspa.2020.0681>

Dmitri Ponomarev

<https://royalsocietypublishing.org/doi/10.1098/rspa.2021.0025>