

## Special issue: One hundred years of PVI, the Fuchs–Painlevé equation

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## CALL FOR PAPERS

## Special issue: One hundred years of PVI, the Fuchs–Painlevé equation

This is a call for contributions to a special issue of *Journal of Physics A: Mathematical and General* entitled ‘One hundred years of Painlevé VI, the Fuchs–Painlevé equation’. The motivation behind this special issue is to celebrate the centenary of the discovery of this famous differential equation. The Editorial Board has invited P A Clarkson, N Joshi, M Mazzocco, F W Nijhoff and M Noumi to serve as Guest Editors for the issue.

The nonlinear ordinary differential equation, which is nowadays known as the Painlevé VI (PVI) equation, is one of the most important differential equations in mathematical physics. It was discovered 100 years ago by Richard Fuchs (son of the famous mathematician Lazarus Fuchs) and reported for the first time in *Comptes Rendus de l’Academie des Sciences Paris* **141** 555–8 (1905). Gambier, in his seminal paper of 1906, included this equation as the top equation in the list of what are now known as the six Painlevé transcendental equations. The Painlevé list emerged from the work on the classification of all ordinary second-order differential equations whose general solution are ‘uniform’, in the sense that there are no movable (i.e. as a function of the initial data) singularities (meaning branch points) worse than poles. The latter is known as the Painlevé property.

As the top equation in the Painlevé list of transcendental equations, the importance of PVI can be appreciated by recognizing that this is a universal differential equation, which is the most general (in terms of number of free parameters) of the known second order ODEs defining nonlinear special functions. As such, parallels can be drawn between the role played by PVI transcendents in the nonlinear case and the hypergeometric functions at the linear level. In fact, the monograph *From Gauss to Painlevé* by K Iwasaki, H Kimura, S Shimomura and M Yoshida (Vieweg, 1991), draws very clearly the line stretching over more than 150 years of special function theory in which PVI is placed as the key equation. In recent years these lines have been extended into the discrete domain, i.e. the field of nonlinear ordinary *difference* equations, and discrete analogues of PVI have opened entirely new fields of investigation.

The aim of the special issue, dedicated specifically to the PVI equations and its avatars rather than to general Painlevé theory, is to consolidate the state-of-the-art knowledge of the properties of this equation and to highlight modern developments (including generalizations of PVI, such as the Garnier system, as well as discrete versions of the equation). The issue should be a repository of high-quality original research papers as well as some invited topical reviews.

### Scope of the special issue

The special issue is dedicated to the study of the Painlevé VI equation, its solutions and properties, and to its generalizations—either in the direction of higher-order differential equations associated with PVI (and related Garnier and Schlesinger systems), or in the direction of difference analogues of the equation. The special issue will welcome contributions that go into the analysis (including asymptotic theory) of Painlevé VI transcendents, the corresponding

monodromy theory, the representation theory aspects, the underlying algebraic geometry of the solution manifolds, associated combinatorics and random matrix theory, as well as  $q$ -difference and discrete versions of the equation, and last but not least applications in physics.

Papers dealing primarily with Painlevé equations other than PVI, or with general Painlevé theory, are not encouraged as these would deflect the contents of the special issue from its specific celebrational motivation.

### **Editorial policy**

All contributions to the special issue will be refereed in accordance with the refereeing policy of the journal. The Guest Editors will reserve the right to judge whether a contribution fits the scope of the topic of the special issue.

### **Guidelines for preparation of contributions**

- We aim to publish the special issue in the first half of 2006, in order not to lose the connection with the celebrational year 2005, marking the 100-year anniversary of the discovery of PVI. To realize this, the deadline for contributed papers will be **31 January 2006**.
- There is a page limit of 16 printed pages (approximately 9600 words) per contribution. For submitted papers exceeding this length the Guest Editors reserve the right to request a reduction in length. Further advice on document preparation can be found at [www.iop.org/Journals/jphysa](http://www.iop.org/Journals/jphysa)
- Contributions to the special issue should if possible be submitted electronically by web upload at [www.iop.org/Journals/jphysa](http://www.iop.org/Journals/jphysa), or by email to [jphysa@iop.org](mailto:jphysa@iop.org), quoting 'J. Phys. A Special Issue: Painlevé VI'. Submissions should ideally be in standard LaTeX form; we are, however, able to accept most formats including Microsoft Word. Please see the website for further information on electronic submissions.
- Authors unable to submit electronically may send hard-copy contributions to: Publishing Administrators, Journal of Physics A, Institute of Physics Publishing, Dirac House, Temple Back, Bristol BS1 6BE, UK, enclosing electronic code on floppy disk if available and quoting 'J. Phys. A Special Issue: Painlevé VI'.
- All contributions should be accompanied by a read-me file or covering letter giving the postal and email address for correspondence. The Publishing Office should be notified of any subsequent change of address.

The special issue will be published in the paper and online version of the journal. The corresponding author of each contribution will receive a complimentary copy of the issue.

**P A Clarkson (University of Kent)**  
**N Joshi (University of Sydney)**  
**M Mazzocco (University Manchester)**  
**F W Nijhoff (University of Leeds)**  
**M Noumi (Kobe University, Japan)**

**Guest Editors**