

# Curriculum Vitae (June 2, 2010)

## Bernard PHILIPPE

Directeur de recherche INRIA  
1<sup>st</sup> class - emeritus

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BP with some participants of the UNESCO  
chair

« *Mathematics and Development* »  
ENIT/LAMSIN, Tunis, April 2004

## 1 Administrative data

### 1.1 Civil status

Born 27th of September, 1948 in Versailles; French citizenship. Married, three adult children.

*Distinction* : Chevalier dans l'Ordre de la Valeur du Cameroun (distinction granted by Cameroon).

### 1.2 Education

1970 : Maîtrise de mathématiques (Université d'Orléans)

1972: Agrégation de mathématiques.

1979 : Maîtrise d'informatique (Université de Rennes 1).

1980 : DEA d'Analyse Numérique (Université de Rennes 1)

1983 : Thèse de Troisième cycle en analyse numérique (Université de Rennes 1).

1989 : Habilitation à diriger les recherches en informatique (Université de Rennes 1).

### 1.3 Positions

1972 - 1974: Military cooperant and civil cooperant : mathematics teacher in high school at Batna (Algeria).

1974 - 1981: Mathematics teacher in high schools (4 years in Alençon and 3 years in Rennes).

**From 1981 : Researcher at INRIA-Rennes**, for the first position as Chargé de recherche (first class), in 1990 as second class of Directeur de recherche and first class on January 1, 2008.

2009 : Emeritus status from Sep. 1.

### Visiting foreign labs :

- 1984 - 1985 : Visiting researcher at CSRD (Center for Supercomputing R & D, Urbana-Champaign (Illinois, USA). Advisor : A. Sameh.
- 2003 – 2004 : Visiting professor at LAMSIN/ENIT (Ecole Nationale d'Ingénieurs de Tunis, Université de Tunis El Manar, Tunisia). Inviting professor: M. Jaoua.
- 2009 (Sep. 1 – Nov. 30): Visiting researcher at the CS department of Purdue University (Indiana). Inviting professor: A. Sameh.

## ***2 Themes of research***

**Thesis :** (Advisor : Michel Crouzeix, University of Rennes 1). Multistep methods for integrating ordinary differential equations.

### **Present topics**

- Large eigenvalue problems, singular values
- Large linear systems and preconditioners
- Sparse QR factorization, Rank-Revealing techniques
- Parallel algorithms
- Reliable computing
- Application (waterground flows)

## ***3 Teaching***

Since 20 years years, I have been teaching at the graduate level, mainly on the following topics :

- Sparse matrix computations
- Iterative methods for large linear systems
- Methods for large eigenvalue problems
- Computer arithmetics and reliability
- Parallelizing numerical algorithms.

From 2005 to 2007, I have been giving a 3h-course on eigenvalue solvers at College Polytechnique in Paris.

## ***4 Scientific animation***

### **4.1 Thesis advising**

I have been advisor or co-advisor for 20 PhDs. The last three ones are :

1. **Guy-Antoine Atenekeng Kahou**, PhD between university of Yaoundé I and university of Rennes 1; co-advisor : Emmanuel Kamgnia. (Defended on Dec. 8, 2008 in Yaounde).
2. **Amine Abdelmoula**, PhD between university of Tunis El Manar and university of Rennes 1 ; co-advisor : Maher Moakher.
3. **Mohamed Ziani**, PhD between Ecole Mohamadia d'Ingénieurs de Rabat and university of Rennes 1 ; co-advisors : Rajae Aboulaïch et Frédéric Guyomarc'h (Defended on Oct. 25, 2008 in Rabat).

### **4.2 International co-operation**

#### **European co-operation**

- From 1994 to 1999, I was co-ordinator for two European projects (INCO-Copernicus : project PORTRAIT (CP 940682) and then project STABLE (CP 960237), partners in Bulgaria, Russia, Slovakia, Grece)
- For the **ERCIM consortium** (<http://www.ercim.org/>) and up to 1997, I was the INRIA representative in the steering committee of the Working Group Parallel Processing Network. With Erricos Kontoghiorghes (university of Cyprus), I manage the Working Group : Matrix Computations and Statistics) (<http://www.irisa.fr/sage/wg-statlin/>).

## Co-operation with African teams

Since 1990, I have been involved in such co-operations.

- **With the department of Computer Science of the University of Yaounde I : with Maurice Tchuente and Emmanuel Kamgnia**
  - Teaching at the master level (every year)
  - Participation to the agreement UYI-INRIA-UNU (1992-1998) which has been the frame of the biennial African Conference for Research in Computer Science (**CARI**) <http://www.cari-info.org/> ; I have been secretary of its permanent committee since 1992 to 2002.
  - Participation to the project DIA funded by AUF (Course conception, <http://www.irisa.fr/dia/>)
  - With Maurice Tchuente, co-leader of the project **CAMEREAU** (2001-2004) funded by the French Ministry of Foreign Affairs (hydrogeology)
- **Electronic journal ARIMA:** the <http://www-direction.inria.fr/international/arima/> Chief-editor with Maurice Tchuente (UYI), Mohamed Jaoua (University of Tunis El Manar) and Derrik Kourie (University of Pretoria).
- **SARIMA project** (<http://www.sarima.org>) : project defined with Claude Lobry (University of Nice Sophia-Antipolis) and Jean-Claude Topin (French Ministry of Foreign Affairs) duration : 4 years ; fundings : 1.5 M€
- **With the Department LAMSIN of ENIT (Tunis) :**
  - Teaching at the master level (1999-2004)
  - Sabbatical year in Tunis (2003-2004) ; chair of the first semester of the UNESCO chair *Mathematics and Development* on the theme *High Performance Computing* <http://www.tn.refer.org/unesco/accueil-unesco-eng.html> ; one follow\_up week is organized in Tunis (November 2006)
  - Co-advising A. Abdelmoula with M. Moakher

## Other co-operation

- **Beirut** : Since 1996, participation to the steering committee of a master organized between universities of Beirut, University of Rennes I, University of Reims and EPFL in Lausanne
- **USA** : French partner of three grants between **INRIA and NSF** (National Science Foundation, USA), ( with W.J Stewart at Raleigh, Y. Saad in Minneapolis, A. Sameh in Purdue).

## 4.3 Conference organization

I regularly organized scientific workshops and conferences. Since 2006:

- With Masha Sosonkina (Ames Lab., Iowa), I organized a minisymposium, entitled ``Issues on robustness of Algebraic Parallel Preconditioners'', at the SIAM Conference on Parallel Processing (PP06)
- PMAA'06 , Rennes, Sept. 6-9: fourth edition of the conference Parallel Matrix Algorithms and Applications <http://pmaa06.irisa.fr>
- I organized the invited session ``Matrix Computations and Statistics'' at the congress COMPSTAT'06 in Rome.
- With Rajae Aboulaich, I organized the workshop of the network HYDRO3+3 which was held in Rabat (Sept. 20-22) [http://www.emi.ac.ma/site\\_workshop/](http://www.emi.ac.ma/site_workshop/)
- I was the chairman of the special week ``High Performance Computing'' organized at Tunis by the LAMSIN (November 27-December 1<sup>st</sup>) [http://www.tn.refer.org/unesco/HPC-LAMSIN/accueil\\_fr.htm](http://www.tn.refer.org/unesco/HPC-LAMSIN/accueil_fr.htm).
- Organization of the workshop ``Tools and Methods in North/South Partnership for Research'', in the IST-Africa 2007 Conference, Maputo, Mozambique, May.
- Co-organization of a Summer School in Algeria on Hydrology, Tlemcen, two weeks, May 2008.
- Co-organization of a workshop in Algeria on Open Source software for Scientific computing, three days, October 2008.

- In charge of the track “Scientific Computing” for the conference CARI’08 in Rabat.

#### **4.4 Scientific administration**

- 1992-1997 : leader of the Aladin project (project now followed by the SAGE project)
- up to 1999 : Responsible for the International Relations at IRISA
- 1994-2002 : secretary of the permanent committee of CARI
- from 2004 : secretary and now president of the Groupement d’Interet Scientifique SARIMA.
- from September 1<sup>st</sup>, 2006 : Responsible at INRIA for International Cooperation with African and Middle-East countries

## ***Publications***

Most of them are available from the list at: <http://www.irisa.fr/sage/bernard/List.html>

### **Pre-prints**

[09] B. Philippe, L. Reichel. *On the generation of Krylov Subspaces Bases*. INRIA Research Report RR-7099, 2009. Submitted. Available at: [HAL](#)

(Below are listed papers in journals, book chapters and some recent revised papers of special issues published after a conference. Other publications are indicated in the general list of the SAGE publications: <http://www.irisa.fr/sage/publications> )

### **[A] Thesis**

B. Philippe. *Résolution numérique des équations différentielles ordinaires par deux méthodes linéaires multipas, à pas et ordre variables*. - Thèse de 3<sup>ème</sup> cycle, soutenue le 20 janvier 1983, Université de Rennes.

B. Philippe. *Document de synthèse pour une demande d'habilitation à diriger les recherches* - Université de Rennes, 26 Juin 1989.

### **[B] Publications in international journals or chapters of books :**

[82] B. Philippe. *Stabilité de la méthode des différentiations rétrogrades à pas et ordre variables (méthode de Gear)*. C. R. Acad. Sc. Paris, Sér. I Math. 294, no. 13, pp. 435--437. [Document](#)

[87a] S. S. Lo, B. Philippe et A. Sameh. *A multiprocessor algorithm for the symmetric tridiagonal eigenvalue problem*. SIAM, J. Sci. Statist. Comput, (1987), no. 2, pp. S155--S165. [Document](#)

[87b] B. Philippe. *An Algorithm to Improve Nearly Orthonormal Sets of Vectors on a Vector Processor*. SIAM, J. Algebraic Discrete Methods, (1987) Vol. 8, no.3 pp. 396--403. [Document](#)

[91] W. Jalby et B. Philippe. *Stability Analysis and Improvement of the Block Gram-Schmidt Algorithm*. SIAM J. Sci. Stat. Comput., 12 (1991) no. 5 pp. 1058--1073. [Document](#)

[92] B. Philippe, Y. Saad et W. Stewart. *Numerical Methods in Markov Chain Modelling*. Operations Research, Vol. 40, No. 6, 1992. [Preprint](#)

[93a] P. Chartier et B. Philippe. *A Parallel Shooting Technique for Solving Dissipative ODE's , Part 1: Theoretical Analysis ; Part 2 : Numerical Implementation*. Computing 51 (1993) no. 3-4, pp. 209-236. [Document](#)

[93b] B. Philippe et B. Vital. *Parallel Implementations for Solving Generalized Eigenvalue Problems with Sparse Matrices*. Appl. Numer. Math. 12 (1993) no. 5, pp. 391--402.

[94] M. Crouzeix, B. Philippe et M. Sadkane. *The Davidson Method*. SIAM J. Sci. Comput. 15 (1994) no. 1, pp. 62--76. [Document](#)

[97a] J-C. Bajard, O. Beaumont, J-M. Chesneaux, M. Daumas, J; Erhel, D. Michelucci, J-M. Muller, B. Philippe, N. Revol, J-L. Roch et J. Vignes. *Qualité des Calculs sur Ordinateurs*. (with Beaumont and Erhel : Chapitre *Arithmétique d'intervalles*), Masson, 1997.

- [97b] R. Erra et B. Philippe. *On some structured inverse eigenvalue problems*. Numer. Algorithms, 15 (1997), no. 1, pp. 15--35. [Preprint](#)
- [97c] V. Heuveline, B. Philippe et M. Sadkane. *Parallel computation of spectral portrait of large matrices by Davidson type methods*. Numer. Algorithms, 16 (1997) no. 1, pp. 55-75.
- [97d] B. Philippe et M. Sadkane. *Computation of the fundamental singular subspace of a large matrix*. Linear Algebra Appl. 257 (1997), pp. 77-104. [Preprint](#)
- [99a] H. Hoteit, R. Sauleau, B. Philippe, P. Coquet et J.P. Daniel. *Vector and parallel implementations for the FDTD analysis of millimeter wave planar antennas*. International Journal of High Speed Computing, 10(1999), no. 2, pp. 209--234.
- [99b] C. Tadonki, B. Philippe. *Parallel multiplication of a vector by a Kronecker product of matrices (part I)*. Parallel and Distributed Computing Practices, 2 (1999), no. 4, pp. 53-67. [Preprint](#)
- [00a] O. Beaumont, J. Erhel, B. Philippe, chap. : *Aquarels : a problem-solving environment for validating scientific software* in Enabling technologies for computational science, Kluwer Academic Publishers, Boston, 2000.
- [00b] B. Philippe. chap. *Fiabilité des systèmes*. In Mathématiques en situation - Issues de l'épreuve de modélisation de l'Agrégation, 11 (2000) SCOPOS (Springer). [Preprint](#)
- [00c] C. Tadonki, B. Philippe. *Parallel multiplication of a vector by a Kronecker product of matrices (Part II)*. Parallel and Distributed Computing Practices, Vol. 3 (3), 2000. [Preprint](#)
- [01a] O. Beaumont, B. Philippe. *Linear interval tolerance problem and linear programming techniques*. Reliable computing, 7(6), pp 433-437, 2001. [Preprint](#)
- [01b] O. Bertrand et B. Philippe. *Counting the eigenvalues surrounded by a curve*. Siberian Journal of Industrial Mathematics, Tome 4 (2001), no. 2, pp. 73--94. [Preprint](#)
- [02a] H. Hoteit, J. Erhel, R. Mosé., B. Philippe et P. Ackerer. *Numerical reliability for mixed methods applied to flow problems in porous media*. J. of Comput. Geosci., 6 (2002), no. 2, pp. 161--194. [Preprint](#)
- [02b] H. Hoteit, R. Mosé, B. Philippe, Ph. Ackerer et J. Erhel. *The Maximum Principle Violations of the Mixed-Hybrid Finite Element Method applied to Diffusion Equations*. Internat. J. Numer. Methods Engrg, 55 (2002), no. 12, pp 1373--1390. [Preprint](#)
- [02c] D. Mezher and B. Philippe. *Parallel computation of pseudospectra of large sparse matrices*. Parallel Comput., 28 (2002), pp 199-221. [Document](#)
- [02d] D. Mezher and B. Philippe. *PAT - A reliable path following algorithm*. Numer. Algorithms, 29 (2002), no. 1-3, pp 131--152. [Document](#)
- [03] R. B. Sidje, K. Burrage, B. Philippe. *An augmented Lanczos algorithm for the efficient computation of a dot-product of a function of a large sparse symmetric matrix*. Computational Science --- ICCS 2003. Part III, pp 693—704, Lecture Notes in Comput. Sci., 2659, Springer, Berlin 2003.
- [04] H. Hoteit, P. Ackerer, R. Mosé, J. Erhel, B. Philippe. *New two-dimensional slope limiters for discontinuous Galerkin methods on arbitrary meshes*. Internat. J. Numer. Methods In Engrg 61 (2004), no. 14, pp 2566--2593. [Preprint](#)

- [05] Atenekeng-Kahou, G.; Kamgnia, E. & Philippe, B. Parallel Implementation of an Explicit Formulation of the Multiplicative Schwarz Preconditionner 17th IMACS World Congress, 2005, Paper T1-I-51-091 [Document](#)
- [06a] M. W. Berry, D. Mezher, B. Philippe, A. Sameh. - *Parallel Algorithms for the Singular Value Decomposition*, in Handbook on Parallel Computing and Statistics., ed. E. Kontoghiorghes, pp 117--164, Stat. Textb. Monogr., 184, Chapman & Hall/CRC, Boca Raton, Fl 2006. [Chapter](#)
- [06b] B. Philippe, M. Tchunte. – *Technologies de l’information et de la communication et fracture numérique*, in Sciences et pays en développement : Afrique subsaharienne francophone. Rapport sur la Science et la Technologie (RST) de l’Académie des Sciences, F. Gros rédacteur, Ed. Tex et Doc Lavoisier, pp 59-4, 2005. [Preprint](#)
- [07a] G-A. Atenekeng Kahou, E. Kamgnia, B. Philippe. - *An explicit formulation of the multiplicative Schwarz preconditionner*, Appl. Numer. Math., 57 (2007), no. 11-12, pp. 1197-1213. [Document](#)
- [07b] B. Philippe, Y. Saad. *On correction equations and domain decomposition for computing invariant subspaces*, Comput. Methods Appl. Mech. Engrg., 196 (2007), no. 8, pp. 1471—1483. [Document](#)
- [08a] I. T. Dimov, B. Philippe, A. Karaivanova, C. Weihrauch. *Robustness and applicability of Markov chain Monte Carlo algorithms for eigenvalue problems*, Appl. Math. Model. 32 (2008), no. 8, pp. 1511-1529. [Document](#)
- [08b] N. Gmati, B. Philippe. *Comments on the GMRES convergence for preconditionned systems*. LNCS (2007), no. 4818, pp 40--51. [Preprint](#)
- [08c] B. Philippe, Y. Saad. *Calcul des valeurs propres* Techniques de l'Ingénieur Méthodes numériques de base - Algèbre numérique, 2008, AF1224, 45 pages [Document](#)
- [08d] A. Abdelmoula, M. Moakher, B. Philippe . *Localized spectral analysis for an inverse problem in geodesy*, Proc. CARI'08, eds E. Badouel, A. Sbihi, M. Assogba, pp. 369--376. [Document](#)

**[C] Editor of special issues:**

- [1] Co-editor with M. Tchunte of the special issue *CARI'96*, volume 17. Technique et science informatiques, HERMES, June 1998.
- [2] Co-editor with M. Tchunte of the special issue *CARI'98* - Colloque Africain de la Recherche en Informatique, volume 19. Technique et science informatiques, HERMES, 2000.
- [3] Co-editor with P. Chartier of the special issue *Sparse matrices and differential equations in industry*, volume 24. Numer. Algorithms, 2000.
- [4] Editor of the special issue *Les applications du calcul parallèle*, volume 11. Calculateurs parallèles, HERMES, 2000.
- [5] Co-editor with M. Tchunte of the special issue *CARI2000* – Electronic Journal ARIMA, 2002.
- [6] Co-editor of *Parallel Matrix Algorithms and Applications* (PMAA '02). P. Arbenz, E. Gallopoulos, B. Philippe, Y. Saad (eds.), Parallel Computers, Vol. 29, No 9, 2003
- [7] Co-editor of *Parallel Matrix Algorithms and Applications* (PMAA '04). E. Kontoghiorghes, B. Philippe (eds.), Appl. Numer. Math. 57 (2007), no. 11-12, 1163.

[8] Co-editor of *Parallel Matrix Algorithms and Applications* (PMAA '06). L. Grigori, B. Philippe, A. Sameh, D. Tromeur-Dervout, M. Vajtersic (eds.), *Parallel Computers*, 34 (2008), no. 6-8.