

# Alberto Ferrero

## PERSONAL DATA

Date of birth: Asti, 24.6.1976

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## BIO AND EDUCATION

University degree in Mathematics at Università del Piemonte Orientale "Amedeo Avogadro", 5/7/2000.

Ph.D. in Mathematics at Università di Milano, 7/3/2005.

## UNIVERSITY CAREER

2011-	Researcher, Università del Piemonte Orientale
2007-2011	Researcher, Università di Milano-Bicocca
2005-2007	Post-doc position, Università di Pisa

## MAIN FIELDS OF INTEREST

1. Elliptic partial differential equations
2. Nonlinear partial differential equations
3. Shape optimization problems
4. Higher order elliptic problems
5. Nonlinear elliptic equations on Riemannian manifolds
6. Higher order wave equations and applications to models for suspension bridges

## CURRENT ISSUES OF RESEARCH

### 1. Second order quasilinear elliptic equations

We studied a class of quasilinear second order elliptic equations both on bounded domains with suitable boundary conditions and on the entire space. We obtained results about existence, multiplicity and qualitative properties for solutions of those problems.

### 2. Higher order semilinear elliptic equations

We studied a class of fourth order elliptic equations with the biharmonic operator. We focused our attention on some questions like the symmetry of solutions and their regularity. Moreover, we also considered particular non- standard boundary conditions and studied optimal shape problems related to them.

### **3. Monotonicity formulas and applications**

We studied Almgren type formulas and their applications to the study of some qualitative properties for solutions of a class of semilinear elliptic equations with singular potentials. More precisely, of such solutions we studied the asymptotic behavior near the singularity of the potentials and unique continuation principles.

### **4. Fourth order wave equations and applications to the study of the dynamics of suspension bridges**

A special class of nonlinear fourth order wave equations finds an application to the study of the dynamic behavior of structures like suspension bridges. The main purpose of this study is to provide useful information on the stability properties of particular oscillation modes. We conjecture that some oscillation modes, observed in celebrated failures of bridges, could be activated by internal resonance phenomena besides the action of external forces.

### **5. Second order semilinear elliptic problems on Riemannian manifolds with a pole**

Particular interest arose in the last years from the study of elliptic equations with the Laplace-Beltrami operator on Riemannian manifolds such as the  $n$ -dimensional hyperbolic space. We studied existence, qualitative properties and symmetry for a class of semilinear elliptic equations on Riemannian manifolds with a pole and having negative curvature when the distance from the pole tends to infinity.

#### **TOP FIVE PAPERS**

1. Ferrero, F. Gazzola, Existence of solutions for singular critical growth semilinear elliptic equations, *Journal of Differential Equations* 177, 2001, 494-522.
2. A. Ferrero, H.-C. Grunau, The Dirichlet problem for supercritical biharmonic equations with power-type nonlinearity, *Journal of Differential Equations* 234, 2007, 582-606
3. D. Bucur, A. Ferrero, F. Gazzola, On the first eigenvalue of a fourth order Steklov problem, *Calculus of Variations and Partial Differential Equations* 35, 2009, 103-131
4. V. Felli, A. Ferrero, S. Terracini, Asymptotic behavior of solutions to Schrodinger equations near an isolated singularity of the electromagnetic potential, *Journal of the European of Mathematical Society* 13, 2011, 119-174
5. E. Berchio, A. Ferrero, G. Grillo, Stability and qualitative properties of radial solutions of the Lane-Emden-Fowler equation on Riemannian models, *Journal de Mathématiques Pures et Appliquées* 102, 2014, 1-35