Sept 2010

SYLVIE LORENTE

Full Professor

Current Address:

Department of Civil Engineering
National Institute of Applied Sciences
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Born on 11 June 1969, Perpignan, France
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Education:

1992 B.S. (Engineer's Diploma), Civil Engineering, specialty: buildings, environmental engineering, INSA Toulouse, France (INSA = National Institute of Applied Sciences).
1992 M.S. (Diploma of Advanced Studies, DEA), Civil Engineering, INSA Toulouse.
1996 Doctorate in Civil Engineering, INSA Toulouse.

Employment:

1992 – 1995	Doctoral Candidate, INSA Toulouse.
1995 – 1997	Assistant Professor, INSA Toulouse.
1997 – 2006	Associate Professor (Maitre de Conferences), INSA Toulouse.
Since Sept. 2006	Full Professor, INSA Toulouse.
Since Jan. 2006	Adjunct Professor, Duke University, USA
Since Sept. 2010	Visiting Chair Professor of Engineering, Honk Kong Polytechnic university, Hong Kong.

Honors and Awards:

Honorable mention from the professional and scholarly division of the American Association of Publishers for the book *Design with Constructal Theory*, 5 Feb. 2009.

The Order **"Les Palmes Academiques"**, Ministry of National Education, France, Nov. 2008.

James P. Hartnett Memorial Award, International Center for Heat and Mass Transfer, ASME Congress, Nov. 2007, Seattle.

Intelligent Optimal Design Prize, CADLM, Paris (France), October 2006.

Bergles-Rohsenow Young Investigator in Heat Transfer Award, American Society of Mechanical Engineers International, Orlando (Florida, USA), November 2005.

Edward F. Obert Award, American Society of Mechanical Engineers International, Anaheim (California, USA), November 2004.

Research award, Bureau de la Recherche Navale (USA), *International Conference Design & Nature II*, Rhodes, June 2004.

Best paper award, *XIII School Seminar Physical Principles of Experimental and Mathematical Simulation of Heat and Mass Transfer and Gas Dynamics in Power Plants*, Saint Petersburg (Russia), May 2001.

Keynotes/Invited papers

Invited paper, Global distributed energy systems, *The Ravage of the Planet, 2nd Int. Conference on the Management of Natural Resources, Sustainable Development and Ecological Hazards*, Gordon's Bay (South Africa), 15-17 December 2009.

Invited paper, Constructal theory and design of vascular structures, *10th Electronics Packaging Technology Conf.* (EPTC), Singapore, 9-12 December 2008.

Keynote paper, Design with constructal theory: vascularized and distributed energy systems, *Int. Conf. On Heat Transfer, Fluid Mechanics and Thermodynamics* (HEFAT 6), Pretoria (South Africa) 30 June- 2 July 2008.

Keynote paper, Vascularized smart materials with tree and grid flow architectures, *Int. Symposium on Transport Phenomena* (ISTP 18), Daejon (South Korea), 27-30 August 2007.

Keynote paper, Vascularized materials as designed porous media, *Int. Exergy, Energy and Environment Symposium (IEEES-3)*, Evora (Portugal), 1-5 July 2007.

Keynote lecture, Constructal theory and its relevance to Green Energy, *Second International Green Energy Conference*, Oshawa (Canada), June 2006.

Keynote lecture, Constructal theory of energy-system and environment flow configurations, *First Int. Green Energy Conference*, Waterloo (Canada), June 2005.

Keynote lecture, Constructal theory of energy-system and environment flow configurations, *First Int. Green Energy Conference*, Waterloo (Canada), 13-16 June 2005.

Keynote paper, Freedom vs. performance, and the evolutionary development of multi-scale hierarchical flow structures, *Second International Conference on Applied Thermodynamics*, Istanbul (Turkey), May 2005.

Keynote paper, Maximal heat transfer density: optimal distribution of discrete heat sources on vertical walls in channels and enclosures with natural convection, *Int. Thermal Science Seminar*, Bled (Slovenia), June 2004.

Invited Speaker

Course on Design with Constructal Theory, AFRL, Dayton (Ohio), June 3-5, 2010.

Course on Constructal Theory and Design, KFUPM, Dhahran (Saudi Arabia), May 9-10, 2010.

Seminar on Constructal Theory, Int. Institute of Water and Environment Engineering, Ouagadougou (Burkina Faso), March 22-23, 2010.

Design with Constructal Theory, Vascularization, Hong-Kong Polytechnic University, Hong-Kong, January 27, 2010.

Constructal Theory and Vascularization, 3ième MCSUL, Rio Grande (Brazil), November 23, 2009.

Vascular architecture for the cooling of smart materials, Kanazawa University, Japan, October 26, 2009.

Course on Design with Constructal Theory, Helsinki University of Technology, Helsinki (Finland), September 25-28, 2009.

Constructal Theory for the design of smart materials, Suranaree University of Technology, Thailand, June 15, 2009.

Constructal Seminar, Int. Institute of Water and Environment Engineering, Ouagadougou (Burkina Faso), March 9-10, 2009.

Vascular and distributed energy systems, *Int. Workshop Shape and Thermodynamics*, Florence (Italy), September 25-26, 2008.

NATO Advanced Research Workshop on Constructal Human Dynamics, Security and Sustainability, Evora (Portugal), May 20-23, 2008.

Constructal transport through porous media, *ERA (Engineering in Relation with Academy) Short Course*, Lawrence Livermore National Laboratory, Livermore (CA, USA), March 10, 2008.

Vascularized materials as designed porous media, *Faculty of Engineering Distinguished lecture Series*, University of Hong Kong, Hong Kong, October 11, 2007.

Constructal Theory and Design in Nature and Engineering, Univ. of Pretoria (South Africa), March 2, 2007.

First Int. Symposium on Constructal Tree-shaped Flow Architectures, Shanghai (China), October 16-17, 2006.

Workshop on Constructal Theory of Social Dynamics, Duke University, Durham (NC, USA), April 3-5, 2006.

Constructal theory of tree-shaped flow systems, *Géométries multi-échelle, théorie constructale et exergie, Séminaire de la Société Française de Thermique*, Nancy, 16 Mars 2006.

Course on Constructal Design and Complex Flow Structures, Memorial University, St John's, Newfoundland (Canada), September 21-23, 2005.

International Conference on Thresholds and Pattern Dynamics, Perth (Australia), July 3-7, 2005.

Workshop on Constructal Theory of the Generation of Optimal Flow Configurations, Air Force Research Laboratory (USA), La Sapienza University, Rome (Italy), March 17-18, 2005.

Workshop Along with Constructal Theory (Autour de la Théorie Constructale), Lausanne, University, Faculté des Géosciences et Environnement, Lausanne (Switzerland), October 25-29, 2004.

International Summer School on Thermodynamic Optimization and Constructal Design, Yildiz University, Istanbul (Turkey), July 19-24, 2004.

International Conference on Design and Nature, Rhodes (Greece), June 28-30, 2004.

International Symposium on Thermal and Fluid Sciences, Gabrovo (Bulgaria), April 5-6, 2004.

Interview, *Science & Vie*, No. 1034, Nov. 2003, p. 50.

Symposium on Shape and Structure in Engineering and Nature, Evora University, Evora (Portugal), October 21, 2003.

NATO Advanced Study Institute : Emerging technologies in Porous Media, Neptun (Romania), June 9-20, 2003.

Modern Developments in Thermal Sciences, University of Galati (Romania), April 9-10, 2003.

International Summer School on Porous and Complex Flow Structures in Modern Technologies, Evora (Portugal), June 17-21, 2002.

International Conference on Efficiency, Comfort, Energy Preservation and Environmental Protection, Bucharest (Romania), November 28-30, 2001.

International Summer School on Heat Transfer in Porous Media, Neptun (Romania), July 25- August 3, 2001.

International Summer School on Energy Conversion, Conservation and Environmental Impact, Ovidius University, Constanta (Romania), July 21-30, 2000.

International Conference on Efficiency, Comfort, Energy Preservation and Environmental Protection, Bucharest (Romania), Nov. 28 –Dec. 2, 2000.

Forschungszentrum Karlsruhe (Germany), January 19, 2000.

Invited Participant

NATO Advanced Study Institute on Thermodynamics and the Optimization of Complex Energy Systems, Neptun, Romania, July 1998.

Gordon Research Conference on Modern Developments in Thermodynamics, Barga, Italy, April 1999.

Books:

Design with Constructal Theory, A. Bejan & S. Lorente, Wiley, Hoboken, 2008.

La Loi Constructale, A. Bejan, S. Lorente, L'Harmattan, Paris, 2005.

Porous and Complex Flow Structures in Modern Technologies, A. Bejan, I. Dincer, S. Lorente, A. F. Miguel, A. H. Reis, Springer Verlag, New York, 2004.

Along with Constructal Theory, A. Bejan, S. Lorente, A.F. Miguel, A.H. Reis, Presses de l'Université de Lausanne, 2006.

Chapters in Books:

Advanced Engineering Thermodynamics, 3rd ed., pp. 774-782: Section 13.4 Constructal theory of distribution of city sizes, with A. Bejan, A. F.Miguel and A. H. Reis. Section 13.5 Constructal theory of distribution of river sizes, with A. Bejan, A. F.Miguel and A. H. Reis, Wiley, 2006

New and Renewable Technologies for Sustainable Development, N. H. Afgan and M. G. Carvalho, eds.
S. Lorente, M. Bégué, Experimental study of a passive system : a ventilated wall, pp. 333-343, Kluwer Academic Publishers, Boston, 2002.

Emerging Technologies and Techniques in Porous Media,

Chap. 26: S. Lorente, F. Frizon, A. Khitab, J.P. Ollivier, Ionic transport through saturated and reactive porous media, pp. 409-417, Kluwer, Dordrecht, Netherlands, 2004.

Peer-Reviewed Publications:

1. S. Lorente, Contribution to the study of heat transfer in vertical cavities. Applications to brick products. Modeling and experiments, Doctoral Thesis, INSA Toulouse, France, 1996.

2. S. Lorente, M. Petit, R. Javelas, Simplified analytic model for thermal transfer in vertical hollow brick, *Energy and Buildings*, Vol. 24, pp. 95-103, 1996.

3. S. Lorente, M. Petit, R. Javelas, The effects of temperature conditions on the thermal resistance of walls made with different shapes vertical hollow bricks, *Energy and Buildings*, Vol. 28, pp. 237-240, 1998.

4. C. Vasile, S. Lorente, B. Perrin, Study of convective phenomena inside cavities coupled with heat and mass transfers through porous media – Application to vertical hollowed brick – A first approach, *Energy and Buildings*, Vol. 28, pp. 229-235, 1998.

5. A. Bejan, L.A.O. Rocha, S. Lorente, Thermodynamic optimization of geometry: T- and Y- shaped constructs of fluid streams, *Int. J. of Thermal Sciences*, Vol. 39, pp. 949-960, 2000.

6. Lartigue, S. Lorente, B. Bourret, Multicellular natural convection in a high aspect ratio cavity : experimental and numerical results, *Int. J. of Heat and Mass Transfer*, Vol. 43, pp. 3157-3170, 2000 .

7. W. Wechsatol, S. Lorente, A. Bejan, Tree-shaped insulated designs for the uniform distribution of hot water over an area, *Int. J. of Heat and Mass Transfer* Vol. 44, pp. 3111-3123, 2001.

8. B. Lartigue, S. Lorente, B. Bourret, R. Escudié, PIV investigation of multicellular laminar natural flow in vertical bent cavities, *Experimental Heat Transfer*, Vol. 14 (2), pp. 89-106, 2001.

9. B. Lartigue, S. Lorente, B. Bourret, Multicellular laminar natural convection in vertical bent cavities, *Int. J. of Heat and Technology*, Vol. 19 (1), pp. 51-60, 2001.

10. A. Bejan, S. Lorente, Thermodynamic optimization of flow geometry in mechanical and civil engineering, *J. of Non-Equilibrium Thermodynamics*, Vol. 26, pp. 305-354, 2001.

11. S. Lorente, M. Bégué, Experimental study of a passive system: a ventilated wall, *New and Renewable Technologies for Sustainable Development*, N. H. Afgan and M. G. Carvalho, eds., pp. 333-343, Kluwer Academic Publishers, Boston, 2002.

12. W. Wechsatol, S. Lorente, A. Bejan, Development of tree-shaped flows by adding new users to existing networks of hot water pipes, *Int. J. of Heat and Mass Transfer*, Vol. 45, pp. 723-733, 2002.

13. W. Wechsatol, S. Lorente, A. Bejan, Optimal tree-shaped networks for fluid flow in a disc-shaped body, *Int. J. of Heat and Mass Transfer*, Vol. 45, pp. 4911-4924, 2002.

14. L. A. O. Rocha, S. Lorente, A. Bejan, Constructal design for cooling a disc-shaped area by conduction, *Int. J. of Heat and Mass Transfer*, Vol. 45, pp. 1643-1652, 2002.

15. S. Lorente, W. Wechsatol, A. Bejan, Tree-shaped flow structures designed by minimizing path lengths, *Int. J. of Heat and Mass Transfer*, Vol. 45, pp. 3299-3312, 2002.

16. S. Lorente, B. Lacarrière, B. Lartigue, Influence of the geometry on heat transfer by natural convection in a rectangular cavity, *Int. J. of Heat and Technology*, Vol. 20(2), pp. 75-80, 2002.

17. S. Lorente, A. Bejan, Combined flow and strength geometric optimization : internal structure in a vertical insulating wall with air cavities and prescribed strength, *Int. J. of Heat and Mass Transfer*, Vol. 45, pp. 3313-3320, 2002.

18. S. Lorente, Heat losses through building walls with closed, open and deformable cavities, *Int. J. of Energy Research*, Vol.26, pp. 611-632, 2002.

19. S. Lorente, B. Lartigue, Maximization of heat flow through a cavity with natural convection and deformable boundaries, *Int. Comm. Heat and Mass Transfer* Vol. 29, pp. 633-642, 2002.

20. S. Lorente, W. Wechsatol, A. Bejan, Fundamentals of tree-shaped networks of insulated pipes for hot water and exergy, *Exergy, an International Journal*, Vol. 2, pp. 227-236, 2002.

21. S. Lorente, M. Carcassès, J.P. Ollivier, Penetration of ionic species into saturated porous media : the case of concrete, *Int. J. of Energy Research*, Vol. 27, pp. 907-917, 2003.

22. S. Lorente, W. Wechsatol, A. Bejan, Tree-shaped networks for the distribution of hot water, *Research and Development Journal*, Vol. 19(1), pp. 12-15, 2003.

23. S. Lorente, W. Wechsatol, A. Bejan, Optimization of tree-shaped flow distribution structures over a disc-shaped area, *Int. J. of Energy Research*, Vol. 27, pp. 715-723, 2003.

24. F. Frizon, S. Lorente, J.P. Ollivier, P. Thouvenot, Transport model for the nuclear decontamination of cementitious materials, *Comp. Materials Science*, Vol. 27, pp. 507-516, 2003.

25. S. Lorente, F. Frizon, A. Khitab, J. P. Ollivier, Ionic transport through saturated and reactive porous media, Ch. 26 in *Emerging Technologies and Techniques in Porous Media*, pp. 409-417, Kluwer, Dordrecht, Netherlands, 2004.

26. F. Nugue, S. Lorente, J.P. Ollivier, Basis for the prediction of chloride ingress into cement-based materials, *Electronic Magazine of Science and Technology of Constructions Materials*, Vol. 1(1), pp. 10-21, 2004.

27. A. Bejan, S. Lorente, Equilibrium vs. non-equilibrium flow system architectures, *Int. J. of Heat and Technology*, Vol. 22 , pp. 85-92, 2004.

28. S. Lorente, W. Wechsatol, A. Bejan, Tree-shaped flow structures for human-scale and small-scales applications, *Int. J. of Heat and Technology*, Vol. 22 , pp. 15-26, 2004.

29. A.K. da Silva, A. Bejan, S. Lorente, Maximal heat transfer density in vertical morphing channels with natural convection, *Numerical Heat Transfer, Part A,* Vol. 45(2), pp. 135-152, 2004.

30. W. Wechsatol, S. Lorente, A. Bejan, Dendritic heat convection on a disc, *Int. J. of Heat and Mass Transfer*, Vol. 46, pp. 4381-4391, 2003.

31. F. Frizon, S. Lorente, J.P. Ollivier, P. Thouvenot, Modeling the decontamination by electromigration of a porous medium, *J. of Porous Media*, Vol. 7(3) , pp. 213-227, 2004.

32. S. Lorente, Two-objective optimization and robustness, *Design and Nature II*, M. W. Collins and C. A. Brebbia, eds., WIT Press, Southampton, UK, 2004, pp. 359-368.

33. A.K. da Silva, S. Lorente, A. Bejan, Optimal distribution of discrete heat sources on a wall with natural convection, *Int. J. of Heat and Mass Transfer,* Vol. 47, pp. 203-214, 2004.

34. A.K. da Silva, S. Lorente, A. Bejan, Optimal distribution of discrete heat sources on a plate with laminar forced convection, *Int. J. of Heat and Mass Transfer,* Vol. 47, pp. 2139-2148, 2004.

35. A. Bejan, S. Lorente, The constructal law and the thermodynamics of flow systems with configuration, *Int. J. of Heat and Mass Transfer,* Vol 47, pp. 3203-3214, 2004.

36. L. Gosselin, A. Bejan, S. Lorente, Combined 'heat flow and strength' optimization of geometry : mechanical structures most resistant to thermal attack, *Int. J. of Heat and Mass Transfer,* Vol. 47, pp. 3477-3489, 2004.

37. A.K. da Silva, S. Lorente, A. Bejan, Constructal tree heat exchangers, *J. of Applied Physics*, Vol. 96(3), pp. 1709-1718, 2004.

38. W. Wechsatol, S. Lorente, A. Bejan, Tree-shaped flow structures: are both thermal-

resistance and flow-resistance minimizations necessary?, *Int. J. Exergy*, Vol. 1(1), pp. 2-17, 2004.

39. W. Wechsatol, S. Lorente, A. Bejan, Tree-shaped networks with loops, *Int. J. Heat Mass Transfer*, Vol. 48, pp. 573-583, 2005.

40. A. Bejan, S. Lorente, Constructal multi-scale and multi-objective structures, *Int. J. Energy Research*, Vol. 29, pp. 689-710, 2005.

41. A.K. da Silva, S. Lorente, A. Bejan, Constructal multi-scale structures with asymmetric heat sources of finite thickness, *Int. J. Heat Mass Transfer*, Vol. 48(13), pp. 2662-2672, 2005.

42. A. Khitab, S. Lorente, J.P. Ollivier, Predictive model for chloride penetration through concrete, *Magazine of Concrete Research*, Vol. 57(9), pp. 511-520, 2005.

43. F. Frizon, S. Lorente, C. Auzuech, Nuclear decontamination of cementitious materials by electrokinetics: an experimental study, *Cement and Concrete Research*, Vol. 35(10), pp. 2018-2025, 2005.

44. W. Wechsatol, S. Lorente, A. Bejan, Tree-shaped flow architectures: strategies for increasing optimization speed and accuracy, *Numerical Heat Transfer, Part A*, Vol. 48(8), pp. 731-744, 2005.

45. A. Bejan, S. Lorente, Constructal theory of energy-system and environment flow configurations, *Int. J. Exergy*, Vol. 2(4), pp. 335-347, 2005.

46. A. Bejan, S. Lorente, Constructal design and thermodynamic optimization, *Annual Review of Heat Transfer*, Vol. 14(1), pp. 1-17, 2005.

47. S. Lorente, A. Bejan, Svelteness, Freedom to Morph, and Constructal Multi-Scale Flow Structures, *Int. J. Thermal Sciences*, Vol. 44(12), pp. 1123-1130, 2005.

48. S. Lorente, with A. Bejan, A. F. Miguel and A. H. Reis, Constructal theory of distribution of city sizes, Section 13.4 in *Advanced Engineering Thermodynamics*, 3rd ed., Wiley, Hoboken, 2006.

49. A. Bejan, S. Lorente, Design with constructal theory, *Int. J. Engineering Education*, Vol. 22(1), pp. 140-147, 2006.

50. P. Bégué, S. Lorente, Migration versus diffusion through porous media : time dependent scale-analysis, *J. Porous Media*, Vol. 9(7), pp. 637-650, 2006.

51. A.K. da Silva, S. Lorente, A. Bejan, Maximal heat transfer density: optimal distribution of discrete heat sources on vertical walls in channels and enclosures with natural convection, *Energy*, Vol. 31(5), pp. 620-635, 2006.

52. L.A.O. Rocha, S. Lorente, A. Bejan, Conduction tree networks with loops for cooling a heat generating volume, *Int. J. Heat Mass Transfer*, Vol. 49, pp. 2626-

2635, 2006.

53. W. Wechsatol, S. Lorente, A. Bejan, Tree-shaped flow structures with junction losses, *Int. J. Heat Mass Transfer*, Vol. 49, pp. 2957-2964, 2006.

54. K.-M. Wang, S. Lorente, A. Bejan, Vascularized networks with two optimized channel sizes, *Journal of Physics D: Applied Physics*, Vol. 39, pp. 3086-3096, 2006.

55. A. Bejan, S. Lorente, Constructal theory of generation of flow configuration in nature and engineering, *J. Applied Physics, Applied Physics Reviews*, Vol. 100, 041301 1-27, 2006, selected for the Sept. 1, 2006 issue of the *Virtual Journal of Biological Physics Research*.

56. S. Lorente, J.P. Ollivier, Scale analysis of electrodiffusion through porous media, *J. Porous Media*, Vol. 9(4), pp. 307-320, 2006.

57. A. Bejan, S. Lorente, K.-M. Wang, Networks of channels for self-healing composite materials, *J. Applied Physics*, Vol. 100, pp. 033528 1-6, 2006.

58. S. Kim, S. Lorente, A. Bejan, Vascularized materials: tree-shaped flow architectures matched canopy to canopy, *J. Applied Physics*, , Vol. 100, 063525 1-8, 2006.

59. S. Lorente, A. Bejan, Heterogeneous porous media as multiscale structures for maximum flow access, *J. Applied Physics*, Vol. 100(11), 114909, 2006.

60. S. Lorente, with A. Bejan, A. F. Miguel and A. H. Reis, Constructal theory of distribution of river sizes, Section 13.5 in *Advanced Engineering Thermodynamics*, 3rd ed., Wiley, Hoboken, 2006.

61. A. Bejan, S. Lorente, Constructal theory and its relevance to Green Energy, *Int. J. Green Energy*, Vol. 4, pp. 105-117, 2007.

62. T.S. Nguyen, S. Lorente, M. Carcassès, Chloride diffusion through mortar, influence of the temperature level, *Advances in Cement Research*, Vol. 19(1), pp. 17-24, 2007.

63. A. Bejan, S. Lorente, Constructal tree-shaped flow structures, *Applied Thermal Engineering*, Vol. 27, pp. 755-761, 2007.

64. S. Lorente, D. Voinitchi, P. Bégué-Escaffit, X. Bourbon, The single-valued diffusion coefficient for ionic diffusion through porous media, *J. Applied Physics*, Vol. 101(2), 024907, 2007.

65. S. Kim, S. Lorente, A. Bejan, Vascularized materials with heating from one side and coolant forced from the other side, *Int. J. Heat Mass Transfer*, Vol. 50, 3498-3506, 2007.

66. H. Zhang, S. Lorente, A. Bejan, Vascularization with trees that alternate with upside-down trees, *J. Applied Physics*, Vol. 101, 094904, 2007, selected for the May 15, 2007 issue of the *Virtual Journal of Biological Physics Research*.

67. S. Lorente, Constructal view of electrokinetic transfer through porous media, *J. Physics D: Applied Physics*, Vol. 40(9), pp. 2941-2947, 2007.

68. K.-M. Wang, S. Lorente, A. Bejan, Vascularization with grids of channels: multiple scales, loops and body shapes, *J. Physics D: Applied Physics*, Vol. 40, pp. 4740-4749, 2007.

69. D. Voinitchi, S. Julien, S. Lorente, The relation between electrokinetics and chloride transport through cement-based materials, *Cement and Concrete Composites*, Vol. 30, pp. 157-166, 2008.

70. J. Lee, S. Kim, S. Lorente, A. Bejan, Vascularization with trees matched canopy to canopy: diagonal channels with multiple sizes, *Int. J. Heat Mass Transfer*, Vol. 51, pp. 2029-2040, 2008.

71. S. Kim, S. Lorente and A. Bejan, Dendritic vascularization for countering intense heating from the side, *Int. J. Heat and Mass Transf*er, Vol. 51, pp. 5877-5886, 2008.

72. A. Bejan, S. Lorente, Vascularized multi-functional materials and structures, *Advanced Materials Research*, Vol. 47-50, pp. 511-514, 2008.

73. S. Kim, S. Lorente, A. Bejan, W. Miller, J. Morse, The emergence of vascular design in three dimensions, *J. Applied Physics*, Vol. 103(12), 123511, 2008.

74. A. Bejan, S. Lorente, J. Lee, Unifying constructal theory of tree roots, canopies and forests, *J. Theoretical Biology*, Vol. 254, pp. 529-540, 2008.

75. T. S. Nguyen, S. Lorente, M. Carcasses, Effect of the temperature on the chloride diffusion through CEM-I and CEM-V mortars, an experimental study, *Construction and Building Materials*, Vol. 23, pp. 795-803, 2009.

76. S. Lorente, A. Bejan, Constructal design of vascular porous materials and electrokinetic mass transfer, *Transport in Porous Media*, Vol. 77, pp. 305-322, 2009.

77. S. Lorente, A. Bejan, Vascularized materials: designed porous media for self-healing and self-cooling, *J. Porous Media*, Vol. 12(1), pp. 1-18, 2009.

78. T. H. Vu, F. Frizon, S. Lorente, Architecture for gas transport through cementitious materials, *J. Phys. D: Applied Physics*, Vol. 42, 105501, 9 p., 2009.

79. L. Combelles, S. Lorente, A. Bejan, Leaflike architecture for cooling a flat body, *J. Applied Physics*, Vol. 106, 044906, 2009.

80. W. Wechsatol, S. Lorente, A. Bejan, J. C Ordonez, The Elemental Shapes (T- and Y- Shapes) of Tree-Shaped Flow Networks Constructed of Ducts with Various Cross-Sectional Shapes, *Journal of Hydraulic Engineering*, Vol. 52, pp. 1230-1239, 2009.

81. K-M. Wang, S. Lorente, A. Bejan, Vascular material cooled with grids and radial channels, *Int. J. Heat and Mass Transfer*, Vol. 52, pp. 1230-1239, 2009.

82. Y. S. Kim, S. Lorente, A. Bejan, Constructal steam generator architecture, *Int. J. Heat Mass Transfer*, Vol. 52, pp. 2362-2369, 2009.

83. J. Lee, S. Lorente, A. Bejan, Transient cooling response of smart vascular materials for self-cooling, *J. Applied Physics*, Vol. 105, 064904, 2009.

84. J. Lee, S. Lorente, A. Bejan, M. Kim, Vascular structures with flow uniformity and small resistance, *Int. J. Heat Mass Transfer*, Vol. 52, pp. 1761-1768, 2009.

85. K-M. Wang, S. Lorente, A. Bejan, The transient response of vascular composites cooled with grids and radial channels, *Int. J. Heat Mass Transfer*, Vol. 52, pp. 4175-4183, 2009.

86. J. Lee, S. Lorente, A. Bejan, Vascular design for thermal management of heated structures, *The Aeronautical Journal*, Vol. 113, pp. 397-407, 2009.

87. S. Kim, S. Lorente, A. Bejan, Transient behavior of vascularized walls exposed to sudden heating, *Int. J. Thermal Sciences*, Vol. 48(11), pp. 2046-2052, 2009.

88. H. Zhang, S. Lorente, A. Bejan, Vascularization wih line-to-line trees in counterflow heat exchange, *Int. J. Heat Mass Transfer*, Vol. 52, pp. 4327-4342, 2009.

89. L. A. O. Rocha, S. Lorente, A. Bejan, Tree-shaped vascular wall designs for localized intense cooling, *Int. J. Heat Mass Transfer*, Vol. 52, pp. 4535-4544, 2009.

90. A. Koosnrisuk, S. Lorente, A. Bejan, Constructal solar chimney configuration, *Int. J. Heat and Mass Transf*er, Vol. 53, pp. 327-333, 2010.

91. Y. S. Kim, S. Lorente, A. Bejan, Distribution of size in steam turbine power plants, *Int. J. Energy Research*, Vol. 33, pp. 989-998, 2009.

92. A. Bejan, S. Lorente, Natural design with constructal theory, *Mechanical Engineering*, Vol. 131, pp. 44-48, 2009.

93. A. Bejan, S. Lorente, La loi constructale et la structure des végétaux, *Alliage*, N° 64, pp. 65-72, March 2009.

94. A. Bejan and S. Lorente, Constructal design principles for vascular smart structures, Ch. 1 in *Constructal Theory and Multi-scale Geometries*, D. Queiros-Condé and M. Feidt, eds., Presses de L'ENSTA, Paris, 2010, pp. 15-24.

95. K-M. Wang, S. Lorente, A. Bejan, Vascular structures for volumetric cooling and mechanical strength, *J. Applied Physics*, Vol. 107, 044901, 2010.

96. A. Bejan and S. Lorente, The constructal law of design and evolution in nature, *Philosophical Transactions of the Royal Society B, Biological Sciences*, Vol. 365, pp. 1335-1347, 2010.

97. S. Lorente, J. Lee and A. Bejan, The "flow of stresses" concept: the analogy between mechanical strength and heat convection, *International Journal of Heat and Mass Transfer*, Vol. 53, pp. 2963-2968, 2010.

98. D-H. Kang, S. Lorente, A. Bejan, Constructal architecture for heating a stream by convection, *Int. J. Heat and Mass Transfer*, Vol. 53, pp. 2248-2255, 2010.

99. Y. S. Kim, S. Lorente, A. Bejan, Steam generator structure: continuous model and constructal design, *Int. J. Energy Research*, DOI: 10.1002/er.1694, 2010.

100. D-H. Kang, S. Lorente, A. Bejan, Constructal configuration for the radiation heating of a solid stream, *J. Applied Physics*, accepted, 2010.

101. E. Cetkin, S. Lorente, A. Bejan, Natural constructal emergence of vascular design with turbulent flow, *J. Applied Physics*, Vol. 107, Issue 11, 2010.

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2. S. Lorente, E. Massias, Protection against solar overheating using high aspect ratio open vertical cavities, *World Renewable Energy Congress*, Florence (Italy), pp.1320-1323, September 20-25, 1998.

3. S. Lorente, M. Bégué, Experimental study of a passive system : a ventilated wall, *Euro conference on New and Renewable Technologies for Sustainable Development*, Madeire (Portugal), (CD Rom). June 26-29, 2000.

4. S. Lorente, B. Lacarrière, B. Lartigue, Influence of the geometry on heat transfer by natural convection in a rectangular cavity, *International Symposium on Transport Phenomena*, Istanbul (Turkey), pp. 227-231, July 16-20, 2000.

5. S. Lorente, Heat transfer through walls with air-filled vertical cavities, *Int. Conf. on Efficiency, Comfort, Energy Preservation and Environmental Protection*, Bucharest (Romania), pp. 229-247, Nov. 28– Dec. 2, 2000.

6. S. Lorente, W. Wechsatol, A. Bejan, Thermodynamic optimization of tree-shaped networks for the distribution of hot water and exergy over an area, *XIII School Seminar Physical Principles of Experimental and Mathematical Simulation of Heat and Mass Transfer and Gas Dynamics in Power Plants,* Saint Petersburg (Russia), pp. 252-255, May 20-25, 2001.

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13. A. Bejan, S. Lorente, Thermodynamic optimization of flow architecture : dendritic structures and optimal sizes of components, Paper No. IMECE2002-33158, *ASME International Mechanical Engineering Congress and Exposition*, New Orleans (USA), Nov. 2002, (CD-Rom).

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18. A. Khitab, S. Lorente, J. P. Ollivier, Chloride diffusion through saturated concrete: numerical and experimental results, *Advances in Concrete through Science and Engineering*, Evanston (Illinois, USA), March 21-26, 2004 (CD-Rom).

19. L. Gosselin, A. Bejan, S. Lorente, Constructal optimization combining heat transfer with other disciplines, *Inverse Problems, Design and Optimization (IPDO) Symposium*, Rio de Janeiro (Brazil), March 17-19, 2004.

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24. A. Bejan, S. Lorente, A course on flow-system configuration and multi-scale design, Paper No. IMECE2004-59203, *ASME International Mechanical Engineering Congress and Exposition*, Anaheim (California, USA), November 2004 (CD-Rom).

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Professional Service:

Vice-President of the National Council of Universities, 60th section.

Founder and Director of the **Social Opening** at INSA: I develop partnerships between selected (disadvantaged) high schools and INSA. The objective is to attract children with high intellectual potential, strong motivation, whose poor social and family environment is a barrier for studies in an elite engineering school. We are implementing programs

dedicated to training these children to acquire elements that are crucial for success: knowledge of industrial world, cultural capital, social codes, selfconfidence, etc.

Elected member of the Scientific Council, INSA Toulouse.

Chief advisor and administrator of each class of 4th-year students enrolled in the Civil Engineering Department, INSA Toulouse.

Elected member of the Departmental Council, Department of Civil Engineering, INSA Toulouse.