



OPTIMIZACIÓN VECTORIAL

CÓDIGO 55

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CÓDIGO: 55

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Presentación

El grupo básico de investigación de Optimización Vectorial empezó su actividad en 1996 y ha dedicado su trabajo al estudio de los Problemas de Optimización Vectorial y de Multifunciones. En este campo ha desarrollado ya los proyectos subvencionados consecutivos BFM2003-02194, MTM2006-02629, MTM2009-09493, MTM2012-30942, MTM2015-68103-P y PGC2018-096899-B-I00 (MCIU/AEI/FEDER, UE), de los programas nacionales de I+D+i. En el primero se trataban los problemas de optimización vectorial y en los cinco últimos se han estudiado también los problemas de optimización de multifunciones, incluyendo las líneas de investigación sobre desigualdades variacionales y problemas de equilibrio vectorial.

En los siguientes enlaces se muestran dos vídeos en los que se comentan aspectos generales del grupo y las principales líneas de investigación.

[Vídeo 1-Optimización](#)

[Vídeo 2-Optimización](#)

En la actualidad, siguiendo las líneas de trabajo anteriores, el grupo está desarrollando el proyecto de referencia PID2020-112491GB-I00 / AEI / 10.13039/501100011033, titulado Incertidumbre y Optimización Vectorial con Aplicaciones en Problemas de Identificación de Parámetros, financiado por el Ministerio de Ciencia e Innovación y Agencia Estatal de Investigación (AEI), con plazo de ejecución del 01-01-2021 al 31-12-2024.

LINEAS DE INVESTIGACIÓN

- Optimization and Applications
- Mathematical Programming
- Multiobjective, Vector and Set-Valued Optimization
- Convex Analysis
- Generalized Convexity and Generalized Monotonicity
- Nonsmooth Analysis
- Generalized Derivatives
- Variational Inequalities
- Vector Equilibrium Problems
- AMS Subject Classification: 26B25, 46N10, 47N10, 49A52, 49J52, 49M37, 90C25, 90C26, 90C29, 90C30, 90C46

PROYECTOS

A) Realizados

•Optimización Vectorial

Entidad financiadora: Ministerio de Ciencia y Tecnología.

Proyecto I+D+i. Referencia: BFM2003-02194.

Ejecución: Del 01-11-2003 al 31-10-2006.

Investigador principal: Vicente Novo Sanjurjo.

Entidades participantes: Departamento de Matemática Aplicada I de la UNED y Departamento de Matemática Aplicada de la Universidad de Valladolid.

Número de miembros del grupo: 5.

•Resolución Aproximada de Problemas de Optimización Vectorial

Entidad financiadora: Consejería de Educación de la Junta de Castilla y León.

Referencia: VA027B06.

Ejecución: Del 01-01-2006 al 31-12-2007.

Investigador principal: César Gutiérrez Vaquero.

Entidades participantes: Departamento de Matemática Aplicada de la Universidad de Valladolid y Departamento de Matemática Aplicada I de la UNED.

Número de miembros del grupo: 3.

•Optimización Vectorial y de Multifunciones

Entidad financiadora: Ministerio de Educación y Ciencia.

Proyecto I+D+i. Referencia: MTM2006-02629.

Ejecución: Del 01-10-2006 al 30-09-2009.

Investigador principal: Vicente Novo Sanjurjo.

Entidades participantes: Departamento de Matemática Aplicada I de la UNED y Departamento de Matemática Aplicada de la Universidad de Valladolid.

Número de miembros del grupo: 5.

•i-Math-Consolider

Entidad financiadora: Ministerio de Educación y Ciencia.

Proyecto Consolider-Ingenio 2010.

Referencia: CSD2006-00032.

Ejecución: Del 01-09-2006 al 31-08-2011.

Investigador principal: Marco Antonio López Cerdá.

Entidades participantes: Practicamente todos los grupos de Investigación españoles con proyectos del Plan Nacional de Matemáticas.

Número de miembros del grupo: 1694 (los 7 de nuestro grupo).

Dentro del programa de actividad investigadora del proyecto, el grupo se integra en la avenida temática D.4: Optimización y técnicas de apoyo a la decisión.

•Optimización de Funciones Vectoriales y de Multifunciones

Entidad financiadora: Ministerio de Ciencia e Innovación.

Proyecto I+D+i. Referencia: MTM2009-09493

Ejecución: Del 01-01-2010 al 30-06-2013.

Investigador principal: Vicente Novo Sanjurjo.

Entidades participantes: Departamento de Matemática Aplicada I de la UNED, Departamento de Matemática Aplicada de la Universidad de Valladolid, Dipartimento di Economia Politica e Metodi Quantitativi de la Università degli Studi di Pavia y Department of Economics de la Università degli Studi dell'Insubria Varese.

Número de miembros del grupo: 9.

•Optimización de Funciones Vectoriales y de Multifunciones

Entidad financiadora: Ministerio de Economía y Competitividad.

Proyecto I+D+i. Referencia: MTM2012-30942

Ejecución: Del 01-01-2013 al 31-07-2016.

Investigador principal: Vicente Novo Sanjurjo.

Entidades participantes: Departamento de Matemática Aplicada I de la UNED, Departamento de Matemática Aplicada de la Universidad de Valladolid, Dipartimento di Economia Politica e Metodi Quantitativi de la Università degli Studi di Pavia y Dipartimento di Discipline matematiche, Finanza matematica ed Econometria, Università Cattolica del Sacro Cuore, Milano (Italy).

Número de miembros del grupo: 9.

•Problemas de optimización y equilibrio con funciones vectoriales y multifunciones

Entidades financiadoras: Ministerio de Economía y Competitividad y el Fondo Europeo de Desarrollo Regional (FEDER).

Proyecto I+D+i. Referencia: MTM2015-68103-P.

Ejecución: Del 01-01-2016 al 31-07-2019 (43 meses).

Investigador principal: Vicente Novo Sanjurjo.

Entidades participantes: Departamento de Matemática Aplicada I de la UNED, Departamento de Matemática Aplicada de la Universidad de Valladolid, Dipartimento di Economia Politica e Metodi Quantitativi de la Università degli Studi di Pavia y Dipartimento di Discipline matematiche, Finanza matematica ed Econometria, Università Cattolica del Sacro Cuore, Milano (Italy) y Departamento de Matemática, Universidad de Tarapacá, Arica (Chile).

Número de miembros del grupo: 9.

•Problemas de optimización vectorial y de conjuntos

Entidades financiadoras: Ministerio de Ciencia, Innovación y Universidades (MCIU), Agencia Estatal de Investigación (AEI) y Fondo Europeo de Desarrollo Regional (FEDER)

Proyecto I+D+i. Referencia: PGC2018-096899-B-I00 (MCIU/AEI/FEDER, UE)

Ejecución: Del 01-01-2019 al 31-07-2021 (31 meses).

Investigador principal: Vicente Novo Sanjurjo.

Entidades participantes: Departamento de Matemática Aplicada I de la UNED, Departamento de Matemática Aplicada de la Universidad de Valladolid, Dipartimento di Economia Politica e Metodi Quantitativi de la Università degli Studi di Pavia y Dipartimento di Discipline matematiche, Finanza matematica ed Econometria, Università Cattolica del Sacro Cuore, Milano (Italy) y Departamento de Matemática, Universidad de Tarapacá, Arica (Chile).

Número de miembros del grupo: 9.

B) En proceso de realización

•Incertidumbre y Optimización Vectorial con Aplicaciones en Problemas de

Identificación de Parámetros

Entidades financiadoras: Ministerio de Ciencia e Innovación y Agencia Estatal de Investigación (AEI)

Proyecto I+D+i. Referencia: PID2020-112491GB-I00 / AEI / 10.13039/501100011033

Ejecución: Del 01-01-2021 al 31-12-2024 (48 meses).

Investigador principal: Miguel Ángel Sama Meige.

Entidades participantes: Departamento de Matemática Aplicada I de la UNED, Departamento de Matemática Aplicada de la Universidad de Valladolid, Dipartimento di Economia Politica e Metodi Quantitativi de la Università degli Studi di Pavia y Dipartimento di Discipline matematiche, Finanza matematica ed Econometria, Università Cattolica del Sacro Cuore, Milano (Italy), Departamento de Matemática, Universidad de Tarapacá, Arica (Chile), Rochester Institute of Technology.

Número de miembros del grupo: 13.

RESULTADOS

Trabajos de los miembros del grupo desde 2002 (ordenados por año):

A) Revistas clasificadas en el JCR de ISI

Desde 2002 hasta 2006

ADÁN, M., NOVO, V. (2002). Optimality conditions for vector optimization problems with generalized convexity in real linear spaces. *Optimization* 51, no. 1, 73-91.

JIMÉNEZ, B. (2002). Strict efficiency in vector optimization. *J. Math. Anal. Appl.* 265, no. 2, 264-284.

JIMÉNEZ, B., NOVO, V. (2002). A finite dimensional extension of Lyusternik theorem with applications to multiobjective optimization. *J. Math. Anal. Appl.* 270, no. 2, 340-356.

JIMÉNEZ, B., NOVO, V. (2002). Alternative theorems and necessary conditions for directionally differentiable multiobjective programs. *J. Convex Anal.* 9, no. 1, 97-116.

JIMÉNEZ, B., NOVO, V. (2002). First and second order sufficient conditions for strict minimality in multiobjective programming. *Numer. Funct. Anal. Optim.* 23, no. 2&3, 303-322.

MIGLIERINA, E., MOLHO, E. (2002). Scalarization and stability in vector optimization. *J. Optim. Theory Appl.* 114, no. 3, 657-670.

ADÁN, M., NOVO, V. (2003). Efficient and weak efficient points in vector optimization with generalized cone convexity. *Appl. Math. Lett.* 16, no. 2, 221-225.

ADÁN, M., NOVO, V. (2003). Weak efficiency in vector optimization using a closure of algebraic type under some cone-convexlikeness. *European J. Oper. Res.* 149, no. 3, 641-653.

JIMÉNEZ, B. (2003). Strict minimality conditions in nondifferentiable multiobjective programming. *J. Optim. Theory Appl.* 116, no. 1, 99-116.

JIMÉNEZ, B., NOVO, V. (2003). A notion of local proper efficiency in Borwein sense in vector optimization. *ANZIAM J.* 45, no. 1, 75-89.

JIMÉNEZ, B., NOVO, V. (2003). First and second order sufficient conditions for strict minimality in nonsmooth vector optimization. *J. Math. Anal. Appl.* 284, no. 2, 496-510.

JIMÉNEZ, B., NOVO, V. (2003). Optimality conditions in directionally differentiable Pareto

problems with a set constraint via tangent cones. *Numer. Funct. Anal. Optim.* 24, no. 5&6, 557-574.

JIMÉNEZ, B., NOVO, V. (2003). Second order necessary conditions in set constrained differentiable vector optimization. *Math. Methods Oper. Res.* 58, no. 2, 299-317.

MIGLIERINA, E., MOLHO, E. (2003). Well-posedness and convexity in vector optimization. *Math. Methods Oper. Res.* 58, no. 3, 375-385.

ADÁN, M., NOVO, V. (2004). Proper efficiency in vector optimization on real linear spaces. *J. Optim. Theory Appl.* 121, no. 3, 515-540.

GIORGI, G., JIMÉNEZ, B., NOVO, V. (2004). On constraint qualifications in directionally differentiable multiobjective optimization problems. *RAIRO-Oper. Res.* 38, no.3, 255-274.

JIMÉNEZ, B., NOVO, V. (2004). Optimality conditions in differentiable vector optimization via second-order tangent sets. *Appl. Math. Optim.* 49, no. 2, 123-144.

LUCHETTI, R.E., MIGLIERINA, E. (2004). Stability for convex vector optimization problems. *Optimization* 53, no. 5-6, 517-528.

MIGLIERINA, E. (2004). Slow solutions of a differential inclusion and vector optimization. *Set-Valued Anal.* 12, no. 3, 34-356.

ADÁN, M., NOVO, V. (2005). Errata Corrige: Proper efficiency in vector optimization on real linear spaces. *J. Optim. Theory Appl.* 124, no. 3, 751-751.

FLORES-BAZÁN, F., LÓPEZ, R. (2005). Characterizing Q-matrices beyond L-matrices. *J. Optim. Theory Appl.* 127, no. 2, 447-457.

FLORES-BAZÁN, F., LÓPEZ, R. (2005). The linear complementarity problem under asymptotic analysis. *Math. Oper. Res.* 30, no. 1, 73-90.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2005). A chain rule for $\cdot$ -subdifferentials with applications to approximate solutions in convex Pareto problems. *J. Math. Anal. Appl.* 310, no. 1, 309-327.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2005). A property of efficient and $\cdot$ -efficient solutions in vector optimization. *Appl. Math. Lett.* 18, no. 4, 409-414.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2005). Multiplier rules and saddle point theorems for Helbig's approximate solutions in convex Pareto problems. *J. Global Optim.* 32, no. 3, 367-383.

MIGLIERINA, E., MOLHO, E. (2005). Convergence of minimal sets in convex vector optimization. *SIAM J. Optim.* 15, no. 2, 513-526.

MIGLIERINA, E., MOLHO, E., ROCCA, M. (2005). Well-posedness and scalarization in vector optimization. *J. Optim. Theory Appl.* 126, no. 2, 391-409.

FLORES-BAZÁN, F., LÓPEZ, R. (2006). Asymptotic analysis, existence and sensitivity results for a class of multivalued complementarity problems. *ESAIM J. Control Optim. Cal. Var.* 12, no. 2, 271-293.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2006). A unified approach and optimality conditions for approximate solutions of vector optimization problems. *SIAM J. Optim.* 17, no. 3, 688-710.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2006). On approximate efficiency in multiobjective programming. *Math. Methods Oper. Res.* 64, no.1, 165-185.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2006). On approximate solutions in vector

optimization problems via scalarization. *Comput. Optim. Appl.* 35, no.3. 305-324.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2006). -Pareto optimality conditions for convex multiobjective programming via max function. *Numer. Funct. Anal. Optim.* 27, no. 1, 57-70.

JIMÉNEZ, B., NOVO, V. (2006). Characterization of the cone of attainable directions. *J. Optim. Theory Appl.* 131, no. 3, 493-499.

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GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2007). Optimality conditions for metrically consistent approximate solutions in vector optimization. *J. Optim. Theory Appl.* 133, no. 1, 49-64.

HERNÁNDEZ, E., JIMÉNEZ, B., NOVO, V. (2007). Weak and proper efficiency in set-valued optimization on real linear spaces. *J. Convex Anal.* 14, no. 2, 275-296.

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GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2008). A set-valued Ekeland's variational principle in vector optimization. *SIAM J. Control Optim.* 47, no. 2, 883-903.

HERNÁNDEZ, E., RODRÍGUEZ-MARÍN, L., SAMA, M. (2008). Epiderivatives with respect to half-spaces. *Taiwanese J. Math.* 12, no. 8, 1965-1978

JIMÉNEZ, B., NOVO, V. (2008). First order optimality conditions in vector optimization involving stable functions. *Optimization* 57, no. 3, 449-471.

JIMÉNEZ, B., NOVO, V. (2008). Higher-order optimality conditions for strict local minima. *Ann. Oper. Res.* 157, no. 1, 183-192.

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LÓPEZ, R., VERA, C. (2008). On the set of weakly efficient minimizers for convex multiobjective programming. *Oper. Res. Lett.* 36, 651-655.

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188, no. 3, 662-682.

MIGLIERINA, E., MOLHO, E., ROCCA, M. (2008). Critical points index for vector functions and vector optimization. *J. Optim. Theory Appl.* 138, no. 2, 479-496.

RODRÍGUEZ-MARÍN, L., SAMA, M. (2008). Epidifferentiability of the map of infima in Hilbert spaces. *J. Math. Anal. Appl.* 342, no. 1, 371-385.

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FLORES-BAZÁN, F., JIMÉNEZ, B. (2009). Strict efficiency in set-valued optimization. *SIAM J. Control Optim.* 48, no. 2, 881-908.

GIORGI, G., JIMÉNEZ, B., NOVO, V. (2009). Strong Kuhn-Tucker conditions and constraint qualifications in locally Lipschitz multiobjective optimization problems. *TOP* 17, no. 2, 288-304.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2009). New second order directional derivative and optimality conditions in scalar and vector optimization. *J. Optim. Theory Appl.* 142, no. 1, 85-106.

HERNÁNDEZ, E., KHAN, A.A., RODRÍGUEZ-MARÍN, L., SAMA, M. (2009). Computation formulas and multiplier rules for graphical derivatives in separable Banach spaces. *Nonlinear Anal.* 71, no. 9, 4241-4250.

HERNÁNDEZ, E., RODRÍGUEZ-MARÍN, L., SAMA, M. (2009). Scalar multiplier rules in set-valued optimization. *Comput. Math. Appl.* 57, no. 8, 1286-1293.

HERNÁNDEZ, E., RODRÍGUEZ-MARÍN, L., SAMA, M. (2009). Some equivalent problems in set optimization. *Oper. Res. Lett.* 37, no. 1, 61-64.

JIMÉNEZ, B., NOVO, V., SAMA, M. (2009). Scalarization and optimality conditions for strict minimizers in multiobjective optimization via contingent epiderivatives. *J. Math. Anal. Appl.* 352, no. 2, 788-798.

LÓPEZ, R. (2009). Stability results for polyhedral complementarity problems. *Comput. Math. Appl.* 58, 1475-1486.

MIGLIERINA, E., MOLHO, E. (2009). Sectionwise connected sets in vector optimization. *Oper. Res. Lett.* 37, no. 4, 295-298.

RODRÍGUEZ-MARÍN, L., SAMA, M. (2009). A note on cones associated to Schauder bases. *Positivity* 13, no. 3, 575-581.

RODRÍGUEZ-MARÍN, L., SAMA, M. (2009). Epidifferentiability and hypodifferentiability of pseudoconvex maps in set-optimization problems. *Nonlinear Anal.* 71, no. 1-2, 321-331.

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223.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2010). Optimality conditions via scalarization for a new epsilon-efficiency concept in vector optimization problems. *European J. Oper. Res.* 201, no. 1, 11-22.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V., THIBAUT, L. (2010). Strict approximate solutions in set-valued optimization with applications to the approximate Ekeland variational principle. *Nonlinear Anal.* 73, no. 12, 3842-3855.

GUTIÉRREZ, C., LÓPEZ, R., NOVO, V. (2010). Generalized epsilon-quasi solutions in multiobjective optimization problems: Existence results and optimality conditions. *Nonlinear Anal.* 72, no. 11, 4331-4346.

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FLORES-BAZÁN, F., GUTIÉRREZ, C., NOVO, V. (2011). A Brézis-Browder principle on partially ordered spaces and related ordering theorems. *J. Math. Anal. Appl.* 375, 245-260.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2011). A generic approach to approximate efficiency and applications to vector optimization with set-valued maps. *J. Global Optim.* 49, no. 2, 313-342.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2011). Higher order strong convexity and global strict minimizers in multiobjective optimization. *J. Convex Anal.* 18, no. 1, 85-103.

Desde 2012 hasta 2016

GUTIÉRREZ, C., HUERGA, L., NOVO, V. (2012). Scalarization and saddle points of approximate proper solutions in nearly subconvexlike vector optimization problems. *J. Math. Anal. Appl.* 389, no. 2, 1046-1058.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2012). Equivalent epsilon-efficiency notions in vector optimization. *TOP* 20, no. 2, 437-455.

GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V. (2012). Improvement sets and vector optimization. *European J. Oper. Res.* 223, no. 2, 304-311.

GUTIÉRREZ, C., MIGLIERINA, E., MOLHO, E., NOVO, V. (2012). Pointwise well-posedness in set optimization with cone proper sets. *Nonlinear Anal.* 75, no. 4, 1822-1833.

HERNÁNDEZ, E., RODRÍGUEZ-MARÍN, L., SAMA, M. (2012). About Hahn-Banach extension theorems and applications to set-valued optimization. *Comput. Math. Appl.* 64, no. 6, 1778-1788.

JADAMBA, B., KHAN, A.A., SAMA, M. (2012). Generalized solutions of quasi variational inequalities. *Optim. Lett.* 6, no. 7, 1221-1231.

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- KHAN, A.A., SAMA, M. (2012). Optimal control of multivalued quasi variational inequalities. *Nonlinear Anal.* 75, no. 3, 1419-1428.
- LÓPEZ, J., LÓPEZ, R., RAMÍREZ, H. (2012). Characterizing Q-linear transformations for semidefinite linear complementarity problems. *Nonlinear Anal. TMA.* 75, 1441-1448.
- LÓPEZ, R. (2012). Approximations of equilibrium problems. *SIAM J. Control Optim.* 50, no. 2, 1038-1070.
- LÓPEZ, R. (2012). Erratum: Approximations of equilibrium problems. *SIAM J. Control Optim.* 50, no. 6, 3374-3374.
- BIANCHI, M., MIGLIERINA, E., MOLHO, E., PINI, R. (2013). Some results on condition numbers in convex multiobjective optimization. *Set-Valued Var. Anal.* 21, no. 1, 47-65.
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- CASINI, E., MIGLIERINA, E., POLYRAKIS, I.A., XANTHOS, F. (2013). Reflexive cones. *Positivity* 17, no. 3, 911-933.
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- JIMENEZ, B., NOVO, V., SAMA, M. (2013). An extension of the Basic Constraint Qualification to nonconvex vector optimization problems. *J. Global Optim.* 56, no. 4, 1755-1771.
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INVESTIGADORES

Nombre y Apellidos	MIGUEL ANGEL SAMA MEIGE
Correo Electrónico	msama@ind.uned.es
Teléfono	91398-7927
Facultad	ESCUELA TÉCN.SUP INGENIEROS INDUSTRIALES
Departamento	MATEMÁTICA APLICADA I
Nombre y Apellidos	ESTHER GIL CID
Correo Electrónico	egil@ind.uned.es
Teléfono	91398-6438
Facultad	ESCUELA TÉCN.SUP INGENIEROS INDUSTRIALES
Departamento	MATEMÁTICA APLICADA I
Nombre y Apellidos	LIDIA HUERGA PASTOR
Correo Electrónico	lhuerga@ind.uned.es
Teléfono	91398-9694
Facultad	ESCUELA TÉCN.SUP INGENIEROS INDUSTRIALES
Departamento	MATEMÁTICA APLICADA I
Nombre y Apellidos	BIENVENIDO JIMENEZ MARTIN
Correo Electrónico	bjimenez@ind.uned.es
Teléfono	
Facultad	
Departamento	
Nombre y Apellidos	VICENTE JOSE NOVO SANJURJO
Correo Electrónico	vnovo@ind.uned.es
Teléfono	
Facultad	
Departamento	

CONGRESOS

Presentaciones de los miembros del grupo en Congresos:

Desde 2002 hasta 2006

GIORGI, G., JIMÉNEZ, B., NOVO, V.: *Minimum principle-type optimality conditions for Pareto problems*, XXVI Convegno Nazionale Associazione per la Matematica Applicata alle Scienze Economiche e Sociali, University of Verona, Italy, September 11-14, 2002.

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MIGLIERINA, E.: *Geometric properties of ordering cones in infinite dimensional vector optimization*. First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI, Bilbao, Spain. June 30 - July 4, 2014 (Comunicación invitada).

MIGLIERINA, E.: *Stability by set convergences: from Vector to Set optimization*. 7th Workshop on Vector Optimization and Related Topics, UNED, Madrid, Spain, October 24, 2014 (Comunicación invitada).

MOLHO, E.: *Scalarization in set optimization*. First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI, Bilbao, Spain. June 30 - July 4, 2014 (Comunicación invitada).

MOLHO, E.: *Scalarization in set optimization: an axiomatic approach*. 7th Workshop on Vector Optimization and Related Topics, UNED, Madrid, Spain, October 24, 2014 (Comunicación invitada).

RODENAS-PEDREGOSA, J.L.: *Introducción a los problemas de equilibrio vectoriales*. Seminario de doctorandos de Matemáticas de la UCM, Universidad Complutense de Madrid, November 6, 2014 (Ponencia invitada).

SAMA, M., GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V.: *Optimality conditions for approximate solutions of unconstrained vector optimization problems*. XI International Symposium on Generalized Convexity and Monotonicity, IMPA, Rio de Janeiro, Brazil. August 25-30, 2014 (Comunicación invitada).

SAMA, M., JADAMBA, B., KHAN, A.A.: *Conical regularization of abstract optimization problems. Some new results and applications*. 7th International Conference. Inverse problems: modelling and simulation, Fethiye, Turkey, May 26-31, 2014 (Comunicación invitada).

SAMA, M.: *Integral regularization of state-constrained elliptic control problems*. 7th Workshop on Vector Optimization and Related Topics, UNED, Madrid, Spain, October 24, 2014 (Comunicación invitada).

SAMA, M.: *A set-valued analysis approach to conical regularization of abstract optimization problems*. The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, July 7-11, 2014 (Comunicación invitada).

SAMA, M.: *Conical regularization of abstract constrained optimization problems*. Workshop on Optimization, Game Theory and Related Topics. Dipartimento di Matematica dell'Università di Genova, Italy. May 8-9, 2014 (Comunicación invitada).

GUTIÉRREZ, C., JIMÉNEZ, B., MIGLIERINA, E., MOLHO, E.: *Nonlinear scalarization mappings for set orderings*. 13th EUROPT Workshop on Advances in Continuous Optimization (EUROPT2015), Edinburgh, Scotland, July 8-10, 2015.

GUTIÉRREZ, C., JIMÉNEZ, B., MIGLIERINA, E., MOLHO, E.: *Scalarization of set-valued optimization problems in normed spaces*. Modelling, Computation and Optimization in Information Systems and Management Sciences (MCO 2015), Metz, France, May 11-13, 2015 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V.: *Approximation of weak efficient solutions in vector optimization*. Modelling, Computation and Optimization in Information Systems and Management Sciences (MCO 2015), Metz, France, May 11-13, 2015 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., NOVO, V., TAMMER, C.: *Duality results for approximate proper solutions in vector optimization*. South Pacific Continuous Optimization Meeting (SPCOM 2015), Adelaide, South Australia, February 8-12, 2015 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., NOVO, V., THIBAUT, L.: *On a proper epsilon-subdifferential for vector mappings. Chain rules*. 27th European Conference on Operational Research (XXVII EURO), Glasgow, Scotland, July 12-15, 2015 (Comunicación invitada).

MOLHO, E., GUTIÉRREZ, C., JIMÉNEZ, B., MIGLIERINA, E.: *An abstract scalarization scheme for quasiordered sets: Some applications to set optimization*. 27th European Conference on Operational Research, Glasgow, Great Britain, July 12-15, 2015 (Comunicación invitada).

SAMA, M., KHAN, A.A.: *Regularization error estimates for integral constraint regularization of state-constrained elliptic control problems*. Joint Mathematics Meetings of the Mathematical Association of America (MAA) and the American Mathematical Society (AMS), San Antonio, Texas, USA, January 10-13, 2015 (Comunicación invitada).

CASINI, E., MIGLIERINA, E., PIASECKI, L., VESELY, L.: *Polyhedrality for Lindenstrauss spaces: an example and a characterization*. Lublin-Italian Friends Workshop 2016 on selected topics of Functional Analysis. Lublin, Poland, June 22-25, 2016 (Comunicación invitada).

GUTIÉRREZ, C., HUERGA, L., NOVO, V.: *Scalarization in ordered sets*. VI Alicante - Elche - Limoges International Conference in Optimization Theory and its Applications (ALEL2016), Cartagena, Spain, June 6-8, 2016 (Comunicación invitada).

HERNÁNDEZ, E., LÓPEZ, R.: *Some useful set-valued maps in set optimization*. 28th European Conference on Operational Research, Poznan, Poland, July 3-7, 2016 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V.: *Limit behaviour and nonlinear scalarization of approximate efficient solutions in vector optimization*. 28th European Conference on Operational Research (EURO2016), Poznan, Poland, July 3-7, 2016 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., NOVO, V.: *Caracterización por escalarización no lineal de soluciones propias Henig en programación multiobjetivo*. X Reunión del Grupo Español de Decisión Multicriterio, Madrid, España, 10 de Junio de 2016 (Comunicación).

HUERGA, L., GUTIÉRREZ, C., NOVO, V.: *Proper efficiency in multiobjective optimization with a polyhedral ordering cone*. 7th International Seminar on Optimization and Variational Analysis (OVA7), Alicante, Spain, June 1-3, 2016 (Poster).

LARA, F., LÓPEZ, R.: *Formulas for the q -asymptotic function via c -conjugates, directional derivatives and subdifferentials*. Seminario Universidad Nacional de educación a Distancia, Madrid, Spain, June 30, 2016 (Comunicación invitada)

LÓPEZ, R.: *Stability results for the multivalued variational inequality problem*. XXIX Jornada de Matemática de la Zona Sur, Santa Cruz, Chile, April 21-23, 2016 (Comunicación invitada).

RÓDENAS-PEDREGOSA, J.L., GUTIÉRREZ, C., NOVO, V.: *Henig proper efficiency for vector equilibrium problems on linear spaces*. 28th European Conference on Operational Research (EURO2016), Poznan, Poland, July 3-7, 2016 (Comunicación invitada).

RÓDENAS-PEDREGOSA, J.L., GUTIÉRREZ, C., NOVO, V.: *Una noción de eficiencia propia para problemas de equilibrio vectorial*. XXXVI Congreso Nacional de Estadística e Investigación Operativa y de las X Jornadas de Estadística Pública (SEIO2016). Toledo, September 5-7, 2016.

RÓDENAS-PEDREGOSA, J.L., JARAMILLO, J.A., JIMÉNEZ-SEVILLA, M., SÁNCHEZ-GONZÁLEZ, L.: *A class of Hamilton-Jacobi equations on Banach-Finsler manifolds*. Babes-Bolyai University, Cluj-Napoca (Romania), March 10, 2016 (Comunicación invitada).

Desde 2017 hasta 2021

CASINI, E., MIGLIERINA, E., PIASECKI, L.: *Separable Lindenstrauss spaces whose duals lack the weak^{*} fixed point property for noexpansive mappings*. Geometric Topology and Geometry of Banach Spaces. 2017, Research workshop of the Israel Science Foundation, Eilat, Israel, May 14-19, 2017 (Comunicación invitada).

GUTIÉRREZ, C., MIGLIERINA, E., MOLHO, E., NOVO, V.: *Stability in set optimization: an image space approach*. Congreso Bienal de la Real Sociedad Matemática Española 2017 (RSME 2017), Zaragoza, Spain, January 30-February 3, 2017 (Comunicación invitada).

GUTIÉRREZ, C.: *Nonlinear scalarization via algebraic mathematical tools*. Congreso Bienal de la Real Sociedad Matemática Española 2017 (RSME 2017), Zaragoza, Spain, January 30-February 3, 2017.

GUTIÉRREZ, C.: *Optimización Multiobjetivo*. Ciclo de conferencias "El IMUVA os habla", Instituto de Matemáticas de la Universidad de Valladolid, Valladolid, 16 de Marzo de 2017 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V.: *Duality results and -subdifferential related to approximate proper solutions of a vector optimization problem*. Congreso Bienal de la Real Sociedad Estadística Española (RSME2017), Zaragoza, Spain, January 30-February 3, 2017 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., NOVO, V.: *Characterization of proper efficiency in multiobjective optimization through nonlinear scalarization*. 12th International Symposium on Generalized Convexity and Monotonicity (GCM12), Hajdúszoboszló, Hungría, August 27-September 2, 2017

HUERGA, L., GUTIÉRREZ, C., NOVO, V.: *Characterization of proper efficient solutions in non-convex multiobjective optimization with a polyhedral ordering cone*. 8th International Seminar on Optimization and Variational Analysis (OVA8), Alicante, Spain, June 29-30, 2017 (Comunicación invitada).

MOLHO, E.: *Stability in set optimization: a set-covergence approach*. 7th German-Polish Conference on Optimization (GPCO 2017), Bedlewo, Poland, August 27 - September 1, 2017 (Comunicación invitada).

RÓDENAS-PEDREGOSA, J.L., GUTIÉRREZ, C., NOVO, V.: *Nonlinear scalarization in real linear spaces and vector equilibrium problems*. 12th International Symposium on Generalized Convexity and Monotonicity (GCM12), Hajdúszoboszló, Hungría, August 27-September 2, 2017.

GUTIÉRREZ, C., HUERGA, L., KÖBIS, E., TAMMER, C.: *Generic properties to scalarize ordered sets*. XXXVII Congreso Nacional de Estadística e Investigación Operativa, Oviedo, Spain. May 29 to June 1, 2018 (Comunicación invitada).

GUTIÉRREZ, C.: *A stationary point theorem for set-valued mappings on a metric space*. Colloquium & International Conference on Variational Analysis and Nonsmooth Optimization (ICVANO2018), Martin-Luther University, Halle-Wittenberg, Halle, Germany. July 2018 (Comunicación invitada).

GUTIÉRREZ, C., NOVO, V., RÓDENAS-PEDREGOSA, J. L.: *A Weierstrass theorem for weakly efficient solutions of vector equilibrium problems*. XXIX European Conference on Operational Research (EURO2018), University of Valencia, Spain, July 2018 (Comunicación

invitada).

GUTIÉRREZ, C., NOVO, V. RÓDENAS-PEDREGOSA, J. L.: *Algebraic nonlinear scalarization in ordered linear spaces*. 16th EUROPT Workshop on Advances in Continuous Optimization (EUROPT2018), University of Almería, Spain, July 2018 (Comunicación invitada).

HERNÁNDEZ, H, LÓPEZ, R.: *Set optimization problems under asymptotic analysis*. XVI EUROPT Workshop on Advances in Continuous Optimization, Almería - Spain, July 11-13, 2018.

HERNÁNDEZ, H, LÓPEZ, R.: *Asymptotic analysis in set optimization*. XXVII Congreso de Matemática Capricornio COMCA'18, Antofagasta - Chile, July 25-27, 2018.

HUERGA, L., GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V.: *Approximate Henig proper solutions in vector optimization with difference of mappings*. XXXVII Congreso Nacional de Estadística e Investigación Operativa. Oviedo, Spain, May 29 to June 1, 2018 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., NOVO, V., SAMA, M.: *Limit behaviour of Henig approximate proper solutions in vector optimization*. XXIX European Conference on Operational Research (EURO2018), University of Valencia, Spain, July 2018 (Comunicación invitada).

JIMÉNEZ, B., GUTIÉRREZ, C., HUERGA, L., NOVO, V.: *Approximate solutions of vector optimization problems via improvement sets in real linear spaces*. XXXVII Congreso Nacional de Estadística e Investigación Operativa, Oviedo, Spain, May 29 to June 1, 2018 (Comunicación invitada).

LÓPEZ, R.: *Global stability results for interval optimization problems*. XXIX European Conference on Operational Research (EURO2018), University of Valencia, Spain, July 2018 (Comunicación invitada).

LÓPEZ, R.: *Variational convergence of vector functions and its application to multiobjective optimization*. International Congress of Mathematicians ICM 2018, Rio de Janeiro - Brasil, August 01-09, 2018.

LÓPEZ, R.: *Set optimization problems*. XXXIV Jornada de Matemática del Departamento de Matemática de la Universidad de Tarapacá, Arica - Chile, November 08-09, 2018.

LÓPEZ, R.: *On convergence notions for sets*. I Congreso Latinoamericano de Matemática COLAMAT, Tacna-Perú, December 06-07, 2018.

MIGLIERINA, E., DE BERNARDI, C. A., MOLHO, E.: *Stability of convex feasibility problem: the finite dimensional case*. XXIX European Conference on Operational Research (EURO2018), University of Valencia, Spain, July 2018 (Comunicación invitada).

MOLHO, E., CAPRARI, E., CERBONI L.: *Some duality results in set optimization with applications*. XXIX European Conference on Operational Research (EURO2018), University of Valencia, Spain, July 2018 (Comunicación invitada).

RÓDENAS-PEDREGOSA, J. L., GUTIÉRREZ, C., NOVO, V.: *Ekeland variational principles for bifunctions via algebraic concepts in the image space*. XXXVII Congreso Nacional de

Estadística e Investigación Operativa, Oviedo, Spain, May 29 to June 1, 2018 (Comunicación invitada).

RÓDENAS-PEDREGOSA, J. L., GUTIÉRREZ, C., NOVO, V.: *Existence of approximate strict solutions of optimization problems*. XXIX European Conference on Operational Research (EURO2018), University of Valencia, Spain, July 2018 (Comunicación invitada).

SAMA, M., JADAMBA, B., KHAN, A., LÓPEZ, R.: *Conical regularization of multiobjective optimization problems*. 23rd International Symposium in Mathematical Programming (ISMP2018), Bordeaux (France), July 2018.

DE BERNARDI, C., MIGLIERINA E.: *Stability for the alternating projections method*. 30th European Conference on Operational Research (EURO 2019), Dublin, Ireland, June 23-26, 2019.

GUTIÉRREZ, C.: *Characterizations of weakly efficient solutions of vector optimization problems*. 30th European Conference on Operational Research (EURO2019), Dublin, Ireland, June 23-26, 2019.

GUTIÉRREZ, C.: *Scalarization results for weakly nondominated solutions of vector optimization problems defined by the notion of quasi interior*. XXXVIII Congreso Nacional de Estadística e Investigación Operativa (SEIO2019), Alcoy, September 3-6, 2019.

HERNÁNDEZ, H., LÓPEZ, R.: *A Gamma-convergence for set-valued maps*. XXXII Jornada de Matemática de la Zona Sur, Punta Arenas - Chile, April 24-26, 2019.

HERNÁNDEZ, H., LÓPEZ, R.: *Stability for set optimization problems via a generalized variational convergence*. XIV International Seminar on Optimization and Related Areas ISORA, Lima - Perú, October 07-11, 2019.

HUERGA, L., GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V.: *Characterization of approximate proper efficiency in vector optimization with difference of mappings*. 30th European Conference on Operational Research (EURO2019), Dublin, Ireland, June 23-26, 2019 (Comunicación invitada).

HUERGA, L., GUTIÉRREZ, C., JIMÉNEZ, B., NOVO, V.: *Optimality conditions for proper solutions in multiobjective optimization with a polyhedral cone*. 28th Spanish Conference on Statistics and Operations Research (SEIO2019), Alcoy, September 3-6, 2019 (Comunicación invitada).

JADAMBA, B., KHAN, A.A., LÓPEZ, R., SAMA, M.: *Conical regularization for multi-objective optimization problems*. II Congreso Latinoamericano de Matemática COLAMAT, Tacna-Perú, December 05-06, 2019.

JIMÉNEZ, B.; NOVO, V.; VILCHEZ, A.: *A set scalarization function based on the oriented distance: first properties and applications to set optimization*. XXXVIII Congreso Nacional de Estadística e Investigación Operativa (SEIO2019), Alcoy, September 3-6, 2019 (Comunicación invitada).

LÓPEZ, R.: *Approximations of interval optimization problems*. IV Congreso Matemático Estudiantil de la Universidad Tomás Frías, Potosí-Bolivia, March 25-29, 2019.

LÓPEZ R., SAMA, M., JADAMBA B., KHAN A.A.: *Conical regularization for multi-objective optimization problems*. II Congreso Latinoamericano de Matemática (COLAMAT), Tacna, Perú, December 05-06, 2019 (Comunicación invitada).

SAMA, M., HAO, D.N, KHAN A.A., TAMMER, C.: *A Energy Functional for Inverse Problems in Variational Inequalities*. Applied Inverse Problems (AIP 2019), Grenoble, France, July 8-12, 2019 (Comunicación Invitada)

SAMA, M., HUERGA, L., JADAMBA, B.: *Kaliszewski dilating cones in infinite dimensional spaces*. 30th European Conference on Operational Research (EURO 2019), Dublin, Ireland, June 23-26, 2019 (Comunicación invitada).

SAMA, M., JADAMBA B., KHAN A.A., LÓPEZ R.: *Conical Regularization for MultiObjective Optimal Control Problems*. 9th International Congress on Industrial and Applied Mathematics, Valencia, Spain, July 15-19, 2019 (Comunicación Invitada)

LÓPEZ, R.: *Derivadas direccionales generalizadas y su aplicación en los problemas de optimización*. III Congreso Latinoamericano de Matemática (COLAMAT), Tacna, Perú, October 29-30, 2020 (Comunicación invitada).

LÓPEZ, R., SAMA, M.: *Horizon maps and graphical convergence revisited*. XI Escuela Dinámicas de Control, Instituto de Investigación Matemática, Universidad Mayor de San Andrés, La Paz, Bolivia, June 22-26, 2020 (Comunicación invitada).

CAPRARI, E., CERBONI BAIARDI, L., MOLHO, E.: *Robustification and scalarization of a parametric vector optimization problem: a noncomponentwise approach*, 31st European Conference on Operational Research – Athens, Greece, 2021, July 11-14 (Comunicación invitada)

CAPRARI, E., CERBONI BAIARDI, L., MOLHO, E.: *Robustification and scalarization of a parametric vector optimization problem: a noncomponentwise approach*, AMASES XVL, session “Optimization, Variational Analysis, and Applications“, September 13-18, 2021 –Distributed remote mode.

DE BERNARDI, C.A.: *Extension of continuous quasiconvex functions*. European Conference on Operational Research EURO 2021, Athens, Greece, July 11-14, 2021 (Comunicación invitada).

DE BERNARDI, C.A.: *Extension of continuous quasiconvex functions*. AMASES XLV Conference, Reggio Calabria, Italy, September 13-18, 2021 (Comunicación invitada).

GUTIÉRREZ, C.: *An algebraic view of the smallest strictly monotonic function*. Centro de Modelamiento Matemático (CMM), Seminario de Optimización y Equilibrio, Santiago de Chile, November 4, 2020 (Comunicación invitada)

GUTIÉRREZ, C.: *Ekeland variational principles in vector equilibrium problems*. 18th Workshop on Advances in Continuous Optimization (EUROPT2021), Toulouse, July 7-9, 2021

GUTIÉRREZ, C.: *Ekeland variational principles for vector functions and order cones with nonempty topological interior*. 31st European Conference on Operational Research (EURO2021), Athens, July 11-14, 2021

GUTIÉRREZ, C.: *Existence conditions for weak efficient solutions in vector optimization*. International Conference on Variational Analysis and Nonsmooth Optimization (ICVANO2021), online-colloquium, July 15-16, 2021 (Comunicación invitada)

JADAMBA, B., HAWKS, R., KHAN, A.A., SAMA, M., YANG, Y.: *Parameter identification problem in a stochastic partial differential equation*, AMS Fall Western Sectional Meeting, October 23-24, 2021

LÓPEZ, R., HERNÁNDEZ, E.: *Stability of set optimization problems*, XVIII EUROPT Workshop on Advances in Continuous Optimization (Online), Toulouse-France, July 07-09, 2021 (Comunicación invitada)

LÓPEZ, R., SAMA, M.: *Horizon maps and graphical convergence*, XXXIII Jornada de Matemática de la Zona Sur (Online), Temuco-Chile, April 20-24, 2021 (Comunicación invitada)

LÓPEZ, R., SAMA, M.: *On multivalued variational inequalities*, XXXI European Conference on Operational Research (Online), Athens-Greece, July 11-14, 2021. (Comunicación invitada)

LÓPEZ, R., SAMA, M.: *Stability of multivalued variational inequalities*, XII Escuela Dinámicas de Control (Online), Instituto de Investigación Matemática, Universidad Mayor de San Andrés, La Paz-Bolivia, July 26-30, 2021. (Comunicación invitada)

MIGLIERINA, E., HUERGA, L., MOLHO, E., NOVO, V.: *Some remarks on proper minimality in set optimization* 31st European Conference on Operational Research (EURO2021), Athens, September 11-14, 2021 (Comunicación invitada)

Desde 2022 hasta la actualidad

AN, D.T.V., GUTIÉRREZ, C.: *Differential stability properties in scalar and vector optimization*. 39th Spanish Conference on Statistics and Operations Research (SEIO2022), Granada, June 7-10, 2022.

CAPRARI E., CERBONI BAIARDI L., MOLHO E. : *Some remarks on scalarization in games with vector pay-offs*. EURO XXXI –Espoo, Finland, July 3-6 2022 (Comunicación invitada).

DE BERNARDI C.A.: *Extension of continuous quasiconvex functions*. European Conference on Operational Research EURO 2022, Espoo, Finland, July 3-6, 2022 (Comunicación invitada).

DE BERNARDI C.A.: *Unit balls of Polyhedral Banach spaces with many extreme points*.

PFAMA - Progress in Functional Analysis: Methods and Applications, Lecce, Italy, September 19-21, 2022.

DE BERNARDI C.A.: *On the Extension of Quasiconvex Functions from Uniformly Convex Sets*. AMASES XLVI Conference, Palermo, Italy, September 22-24, 2022.

DE BERNARDI, C.A., MIGLIERINA E.: *Regularity and stability for a convex feasibility problem*. FAATNA 2022, Functional Analysis, Approximation Theory and Numerical Analysis –Matera, Italy, July 5-8, 2022 (Comunicación invitada).

GUTIÉRREZ, C.: *Differential properties to the weak optimal value mapping in convex vector optimization*. 32nd European Conference on Operational Research (EURO2022), Espoo, July 3-6, 2022.

GUTIÉRREZ, C., LÓPEZ, R.: *Conditions for the existence of weakly efficient solutions to vector optimization problems*. 19th Workshop on Advances in Continuous Optimization (EUROPT2022), Caparica, July 29-30, 2022.

GUTIÉRREZ, C., LÓPEZ, R.: *Existence results for weak efficient solutions of vector optimization problems via scalarization*. 13th International Symposium on Generalized Convexity and Monotonicity (GCM13), Lima, September 13-16, 2022.

HUERGA, L.: *Characterization through scalarization of a new notion of quasi efficiency in multiobjective optimization*. International Meeting on Functional Analysis and Continuous Optimization, Elche, Spain, June 16-17, 2022.

HUERGA, L., JIMÉNEZ, B., LUC, D.T., NOVO, V.: *A unified concept of approximate and quasi efficient solutions in multiobjective optimization*. XXXIX Spanish Conference on Statistics and Operations Research (SEIO 2022), Granada, Spain, June 7-9, 2022 (Comunicación invitada).

MOLHO, E., HUERGA, L., MIGLIERINA, E., NOVO, V.: *On proper minimality in robust vector optimization: a set optimization approach*. 19th EUROPT Workshop on Advances in continuous Optimization, Lisbon, July 29-30, 2022 (Comunicación invitada).

SAMA, M., ARIAS, J.: *Smart thermostat thermal random models for residential buildings*. XXIX Spanish Conference on Statistics and Operations Research (SEIO 2022), Granada, Spain, June 7-9, 2022 (Comunicación invitada).

SAMA, M., ARIAS, J.: *Modelling uncertainty in thermal models for residential buildings*. Euro Opt 2022, Lisboa, Portugal, 29-30 julio, 2022.

GUTIÉRREZ, C.: *Vector versions of the Ekeland variational principle*. XXXVI Jornada de Matemática UTA-2022, Universidad de Tarapacá, Arica (Chile), 6 y 7 de diciembre, 2022 (Comunicación invitada).

GUTIÉRREZ, C.: *On quasi efficient solutions of multiobjective optimization problems*. Nonsmooth And Variational AnaLysis (NAVAL), Institut de Mathématiques de Bourgogne, Dijon (France), June 26-28, 2023.

GUTIÉRREZ, C.: *Quasi efficient solutions in multiobjective optimization*. XV International Seminar on Optimization and Related Areas (XV ISORA), Universidad Nacional de San Agustín de Arequipa, Arequipa (Peru), October 02-06, 2023.

SAMA, M., KHAN, A.: *A new stochastic regularized second-order iterative scheme for optimal control and inverse problems in partial differential equations with random data*. Euro Opt

2023, Budapest, Hungría, 23-25 agosto, 2023 (Comunicación invitada).

SAMA, M.: *Parameter identification in partial differential equations with random data*.

International Workshop in Variational Analysis and Optimization, Messina, Italia, 14-15 septiembre, 2023 (Comunicación invitada).

IGUALDAD DE GÉNERO

En coherencia con el valor asumido de la igualdad de género, todas las denominaciones que en esta Guía hacen referencia a órganos de gobierno unipersonales, de representación, o miembros de la comunidad universitaria y se efectúan en género masculino, cuando no se hayan sustituido por términos genéricos, se entenderán hechas indistintamente en género femenino o masculino, según el sexo del titular que los desempeñe.