RESUM DE TESI DOCTORAL

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Títol de la tesi:	Inclusion of manufacturing sensitivities in optical systems design: characteristics of the generated optimization trajectories.			
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Resum[2]:

Some questions founded nowadays during the design and fabrication of optical systems promotes the reconsideration of their optimization procedures. In this sense, the no-linearities influence in the optical equations prevents, even today, the design and/or manufacturing of all possible lenses. This question is strictly connected with the question of how many configurations of lenses are possible?. Or nearer the spirit of this work, how many manufactured solutions have the non-lineal equation of an optical design problem?

Answering to the previous questions, it can be considered, for example, the great amount of designs constituted by three elements in the photographic field. However, because of the fitted and specific suitability characterization used in the usual optical optimization stage, discordance or incompatible situations are generated between the proposed system and their capabilities. In this situation, the merit function description does not guaranty the convenience of an ad hoc system. In these cases, the exploration and correlative determination of all possible solutions of a specific design problem is important. The resolution of this formulation is tackled in this work obtaining multiple solutions to a specific problem.

The different suggestion of new solutions is produced in a sequential way building a process trajectory. To extract the most possible number of solutions, procedures that explore the optimization space orography to discover the solicited optical systems have been created. In spite of the optical quality variation between the multiple solution resolved (elements of the trajectory), the problems requirements always will be satisfied. Furthermore, all the proposed solutions, elements of the trajectory, do not have manufacturing limitations. This fact is promoted with the inclusion of manufacturing control and sensitivity analysis procedures that disregards the no possible manufacturing systems.

This fabrication or solidness aspects have associated quality perturbations considered in the traditional methods by means of hard tolerances analysis. As an alternative, new stability and manufacturing difficulty properties that allow the selection of solutions clusters has been created. The new properties of each solution and it trajectory constitutes an important tool allowing the appropriate system selection in each situation in terms of sensitivity and manufacturing difficulties. Furthermore, the flexible definition of the process merit function allows to determinate the trajectories whose multiple solutions are usually evaluated through its new properties. It adapts the process to a high number of situations invaliding the unique system optimization concept. The proposed strategy understands the optimization stage as the one that looks for optimum trajectories whose solutions are the most convenient in terms of their new sensitivity properties.

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