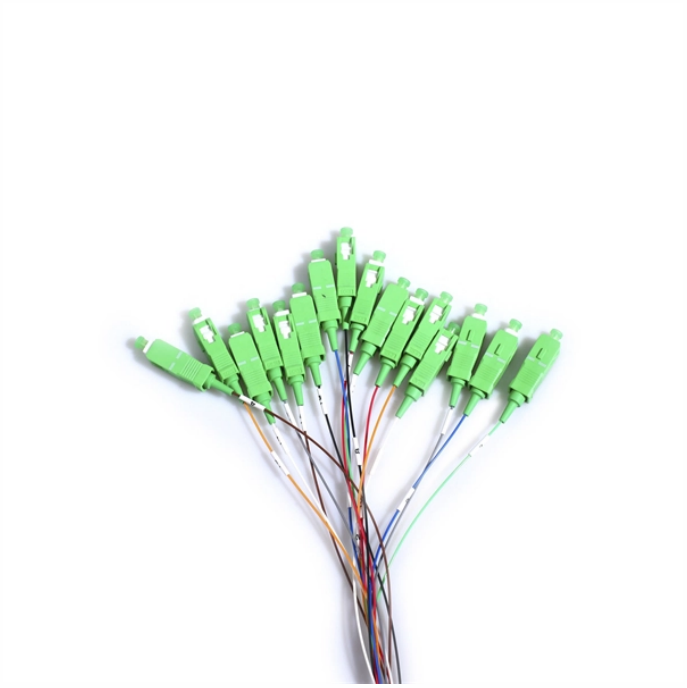
Inverse Optimization Algorithm for Fiber Optic Sensors



Overview

This paper adopts a multi-objective particle swarm optimization (MOPSO) algorithm to optimize the drawing parameters inversely according to the target MOFs, to realize fast and precise fabrication. This paper proposes the improved adaptive large-scale cooperative coevolution (IALSCC) algorithm to obtain the strain sensors deployment on iFEM, and the method includes the initialization strategy, adaptive region partitioning strategy, and gbest selection and particle updating strategies. The microstructured optical fibers (MOFs) fabrication process involves repetitive mapping of the drawing parameters, which is time-consuming, laborious and inefficient, and has become a fundamental obstacle restricting the current design of many MOFs with high excellent performances from being. Abstract: The diverse applications of mode-locked fiber lasers (MLFLs) raise various demands on the output of the laser, including the pulse duration, energy, and shape. Simulation is an excellent method to guide the design and construction of an MLFL for on-demand laser output. Traditional. This paper presents a comprehensive review of AI-enhanced OFS technologies, encompassing both localized sensors such as fiber Bragg gratings (FBG), Fabry–Perot (FP)

interferometers, and Mach–Zehnder interferometers (MZI), and distributed sensing systems based on Rayleigh, Brillouin, and Raman. Inverse design of few-mode fiber by Neural Network for weak-coupling optimization Z. He, "Inverse design of few-mode fiber by Neural Network for weak-coupling optimization," in Optical Fiber Communication Conference (OFC) 2020, OSA Technical.

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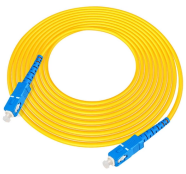
The inverse design model (IDM) aims to provide the inverse design of the structural parameters according to the optical characteristics. The optimal FPM can be obtained using a ...

The inverse finite element method (iFEM) based on fiber grating sensors has been demonstrated as a shape sensing method for health monitoring of large and complex engineering ...

Reverse design of highly GeO 2 -doped silica optical fibers with broadband and flat dispersion profiles is proposed using a neural network (NN) combined with a particle swarm ...



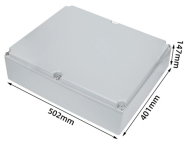
We use a neural network to inversely design a four-ring few-mode fiber for weak-coupling optimization so as to support MIMO-less MDM optical communication. This method provides high-accuracy, high ...

In the next section we demonstrate how to utilise Particle Swarm Optimization algorithm to implement mapping between the desired pulse characteristics and the laser system design ...

In this work, artificial intelligence (AI) is trained to “study” optical fibers as an AI optical fiber scientist. The dataset is constructed on the structural parameters and confinement...

Here, a completely data-driven approach for the inverse design of MLFLs is proposed, which significantly reduces the computational complexity and achieves a fast automatic inverse design of...

In recent years, AI techniques have been increasingly integrated with OFS systems for system-level optimization. In this paper, we classify the applications of AI in OFS into two distinct categories based ...



We propose two machine learning-based inverse design methods for few-mode multi-core fiber, utilizing neural networks and particle swarm optimization algorithms to achieve high ...

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