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KARADENİZ TEKNİK ÜNİVERSİTESİ
Fen Bilimleri Enstitüsü

FBE

**TEZ SAVUNMA SINAVI DUYURU FORMU** | *Form O3*

## I- ÖĞRENCİ BİLGİLERİ

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# LİSANSÜSTÜ TEZ SAVUNMASI

## II- SINAV BİLGİLERİ

Tez Başlığı : METAHEURISTIC PANSHARPENING BASED ON SYMBIOTIC ORGANISMS SEARCH OPTIMIZATION

Tez Özeti :

Due to some technical and non-technical reasons, it may not always be possible to obtain remotely-sensed images of high spatial resolution. Pansharpening offers a robust solution for this problem. Pansharpening aims to transfer the spatial detail content of a high spatial resolution panchromatic (PAN) image into a lower spatial resolution multispectral (MS) image, producing an MS image of the same spatial detail quality as the PAN image. A wide range of pansharpening methods have been proposed so far. Of all, the component substitution (CS)-based pansharpening methods draw attention owing to their simplicity and ability to sharpen images. However, the CS-based methods tend to distort the colour features of the input MS images, due to the inconsistencies between the input PAN image and the intensity component computed from the input MS bands. A wide variety of approaches have been developed to estimate the contributions of the input MS bands on the intensity component to minimize the colour distortion. The previous attempts revealed the fact that improving the colour quality causes spatial distortion to a certain degree, which means that more robust solutions are needed to find the best balance between the spectral and spatial quality offered by the CS-based pansharpening methods. Hence, this thesis, for the first time in the literature, proposed to use the symbiotic organisms search (SOS) algorithm, one of the most powerful metaheuristic optimization algorithms, to estimate a weight for each input MS band in order to optimize the intensity components used by the CS-based synthetic variable ratio (SVR) method and a hybrid method that includes both the intensity-hue-saturation (IHS) and discrete wavelet transform (DWT) methods. This thesis also proposed to use the multi-objective version of the SOS algorithm (MOSOS) to find the best compromise between the spatial and spectral fidelity offered by the SVR and IHS-DWT methods. Using the MOSOS algorithm with these methods also enabled the production of pansharpened images of required spectral or spatial quality

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