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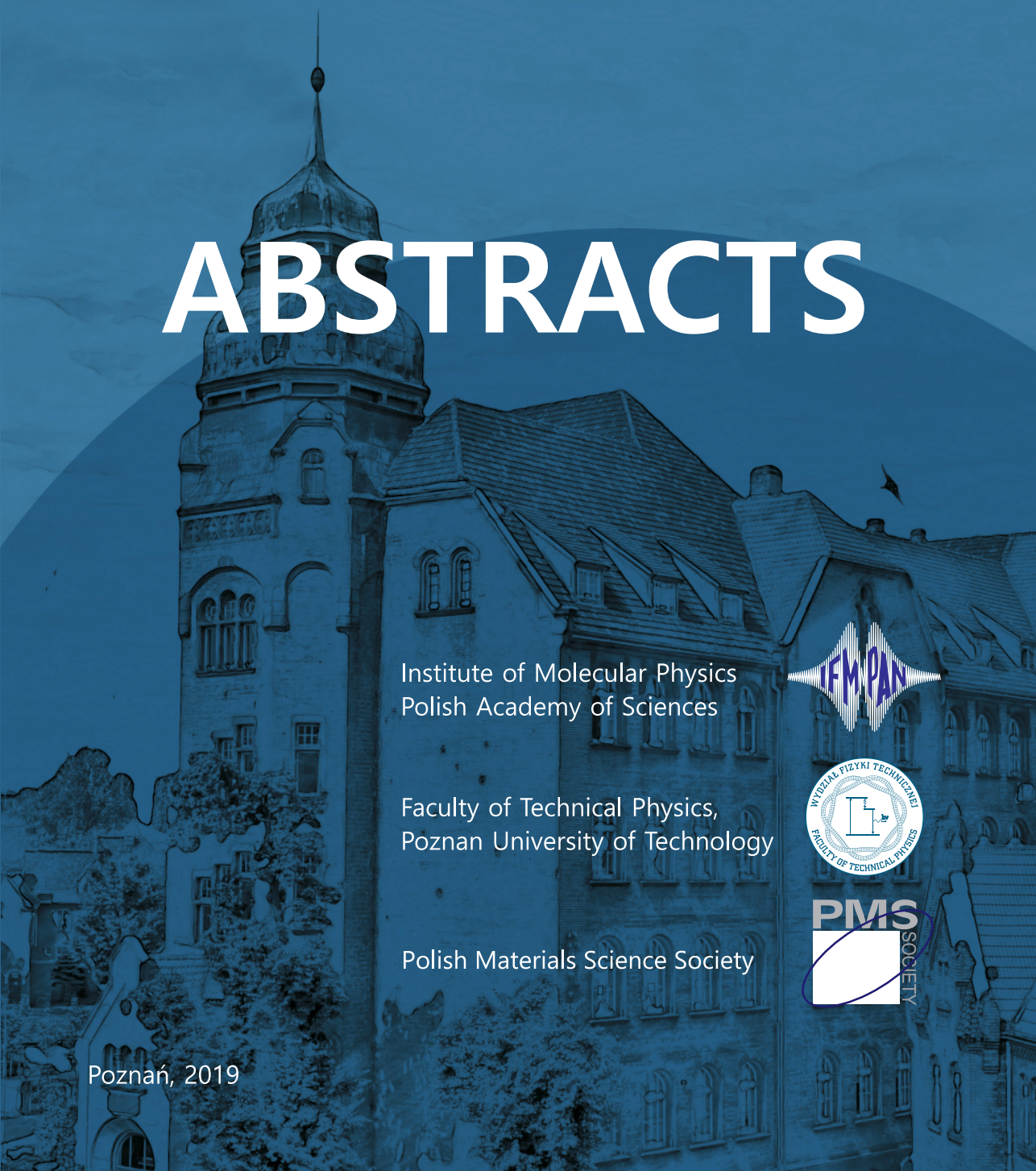
ABSTRACTS



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Spin wave defect states in magnonic quasicrystal

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Phasons are the structural defects which are specific for quasicrystal. They are a local rearrangements of the constituent elements in the quasiperiodic structure. The phasons in atomic systems diffuse within the structure and coexist with phononic excitations. Here, we investigated the phasons in artificial magnonic quasicrystals – a Fibonacci sequence of Py and Co stripes. We considered phasonic defects in this system as a peculiar kind of static rearrangement of magnetic stripes. The phasonic defects are introduced by swapping the neighbouring Py and Co stripes in selected Py|Co pairs. The main goal of this study is to find the impact of the phasonic-like disorder on the spectrum and on the localization of spin wave eigenmodes in magnonic quasicrystals.

We investigated the perturbed Fibonacci sequences of stripes with lower concentrations of phasonic defects. The introduction of such defects does not change the average values of material parameters for considered composite structures. Therefore, in the regime of long-wavelengths, the spectrum of eigenmodes is the same as for the unperturbed Fibonacci sequence. In the frequency ranges corresponding to the band gaps we observed the gradual smoothing of IDOS which results in the bandgap closing for larger concentration of phasonic defects. We found out, that each spin wave defect mode occupies only few selected locations of phasonic defects. The selection of occupied defect(s) is different for different spin wave modes.

The calculations were done using the plane wave method with the supercell approach and were furtherb compared to the outcomes of the finite element method performed with the aid of the COMSOL Multiphysics package.

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