

### DECLARATION OF GERARD P. GRENIER

I, Gerard P. Grenier, am over twenty-one (21) years of age. I have never been convicted of a felony, and I am fully competent to make this declaration. I declare the following to be true to the best of my knowledge, information and belief:

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8. The article below, along with its abstract, has been attached as Exhibit A to this declaration:

A.	B.M. Popovic, "Generalized chirp-like polyphase sequences with optimum correlation properties," IEEE Transactions on Information Theory, Vol. 38, Issue 4, July 1992.
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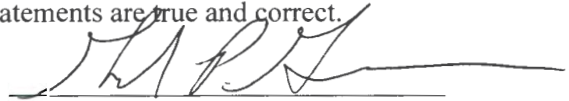
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11. B.M, Popovic, "Generalized chirp-like polyphase sequences with optimum correlation properties" was published in IEEE Transactions on Information Theory, Vol. 38, Issue 4. The article abstract states that IEEE Transactions on Information Theory, Vol. 38, Issue 4 was published in July 1992. This publication happened no later than the last day of the month. The article is currently available for public download from the IEEE digital library, IEEE Xplore.

12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I declare under penalty of perjury that the foregoing statements are true and correct.

Executed on: 5 April 2016

A handwritten signature in black ink, appearing to be "M. P. S.", written over a horizontal line.

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# Generalized chirp-like polyphase sequences with optimum correlation properties

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Author(s)

B. M. Popovic ; IMTEL Inst. of Microwave Tech. &amp; Electron., Novi Beograd, Yugoslavia

Abstract

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A new general class of **polyphase sequences** with ideal periodic autocorrelation function is presented. The new class of **sequences** is based on the application of Zadoff-Chu **polyphase sequences** of length  $N=sm^2$ , where  $s$  and  $m$  are any positive integers. It is shown that the generalized **chirp-like sequences** of odd length have the **optimum** crosscorrelation function under certain conditions. Finally, recently proposed generalized P4 codes are derived as a special case of the generalized **chirp-like sequence**

**Published in:**

IEEE Transactions on Information Theory (Volume:38 , Issue: 4 )

**Page(s):**

1406 - 1409

**ISSN :**

0018-9448

**INSPEC Accession Number:**

4251126

**DOI:**

10.1109/18.144727

**Date of Publication :**

Jul 1992

**Date of Current Version :**

Tue Aug 06 00:00:00 EDT 2002

**Issue Date :**

Jul 1992

**Sponsored by :**

IEEE Information Theory Society

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