

## ON A CLASSIC EXAMPLE IN THE NONNEGATIVE INVERSE EIGENVALUE PROBLEM\*

THOMAS J. LAFFEY<sup>†</sup> AND HELENA ŠMIGOC<sup>†</sup>

**Abstract.** This paper presents a construction of nonnegative matrices with nonzero spectrum  $\tau = (3 + t, 3 - t, -2, -2, -2)$  for  $t > 0$ . The result presented gives a constructive proof of a result of Boyle and Handelman in this special case. This example exhibits a surprisingly fast convergence of the spectral gap of  $\tau$  to zero as a function of the number of zeros that are added to the spectrum.

**Key words.** Nonnegative matrices, Nonnegative inverse eigenvalue problem, Spectral Gap, Companion Matrices.

**AMS subject classifications.** 15A48, 15A18, 15A29.

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<sup>†</sup>School of Mathematical Sciences, University College Dublin, Belfield, Ireland (thomas.laffey@ucd.ie, helena.smigoc@ucd.ie). The first author was supported by Science Foundation Ireland, SFIRFP2005.