ISSN 1855-3966 (printed edn.), ISSN 1855-3974 (electronic edn.)
ARS MATHEMATICA CONTEMPORANEA 22 (2022) #P3.02
**https://doi.org/10.26493/1855-3974.2496.07a**
(Also available at http://amc-journal.eu)

# The adjacency dimension of graphs*

Sergio Bermudo †

*Department of Economics, Quantitative Methods and Economic History, Pablo de Olavide University, Carretera de Utrera Km. 1, 41013-Sevilla, Spain*

José M. Rodríguez

*Departamento de Matemáticas, Universidad Carlos III de Madrid, Avenida de la Universidad 30, 28911 Leganés, Madrid, Spain*

Juan A. Rodríguez-Velázquez

*Universitat Rovira i Virgili, Departament d'Enginyeria Informàtica i Matemàtiques, Av. Països Catalans 26, 43007 Tarragona, Spain*

José M. Sigarreta

*Facultad de Matemáticas, Universidad Autónoma de Guerrero, Carlos E. Adame No. 54 Col. Garita, 39650 Acalpulco Guerrero, Mexico*

Received 1 December 2020, accepted 13 September 2021, published online 9 June 2022

**Abstract**

It is known that the problem of computing the adjacency dimension of a graph is NP-hard. This suggests finding the adjacency dimension for special classes of graphs or obtaining good bounds on this invariant. In this work we obtain general bounds on the adjacency dimension of a graph $G$ in terms of known parameters of $G$. We discuss the tightness of these bounds and, for some particular classes of graphs, we obtain closed formulae. In particular, we show the close relationships that exist between the adjacency dimension and other parameters, like the domination number, the location-domination number, the 2-domination number, the independent 2-domination number, the vertex cover number, the independence number and the super domination number.

*Keywords: Adjacency dimension, metric dimension, location-domination number, independence number, super domination number.*

*Math. Subj. Class. (2020): 05C69, 05C7, 05C12*

*This work has been supported in part by three grants from "Ministerio de Economía y Competitividad, Agencia Estatal de Investigación (AEI)" and "Fondo Europeo de Desarrollo Regional (FEDER)" (MTM2016-78227-C2-1-P, MTM2015-70531 and MTM2017-90584-REDT), Spain, and by Junta de Andalucía, FEDER-UPO Research and Development Call, reference number UPO-1263769.

†Corresponding author.

*E-mail addresses:* sbernav@upo.es (Sergio Bermudo), jomaro@math.uc3m.es (José M. Rodríguez), juanalberto.rodriguez@urv.cat (Juan A. Rodríguez-Velázquez), jsmathguerrero@gmail.com (José M. Sigarreta)

This work is licensed under https://creativecommons.org/licenses/by/4.0/

ISSN 1855-3966 (tiskana izd.), ISSN 1855-3974 (elektronska izd.)
ARS MATHEMATICA CONTEMPORANEA 22 (2022) #P3.02
**https://doi.org/10.26493/1855-3974.2496.07a**
(Dostopno tudi na http://amc-journal.eu)

# Sosednostna dimenzija grafov*

Sergio Bermudo †

*Department of Economics, Quantitative Methods and Economic History, Pablo de Olavide University, Carretera de Utrera Km. 1, 41013-Sevilla, Spain*

José M. Rodríguez

*Departamento de Matemáticas, Universidad Carlos III de Madrid, Avenida de la Universidad 30, 28911 Leganés, Madrid, Spain*

Juan A. Rodríguez-Velázquez

*Universitat Rovira i Virgili, Departament d'Enginyeria Informàtica i Matemàtiques, Av. Països Catalans 26, 43007 Tarragona, Spain*

José M. Sigarreta

*Facultad de Matemáticas, Universidad Autónoma de Guerrero, Carlos E. Adame No. 54 Col. Garita, 39650 Acalpulco Guerrero, Mexico*

Prejeto 1. decembra 2020, sprejeto 13. septembra 2021, objavljeno na spletu 9. junija 2022

**Povzetek**

Znano je, da je problem izračunavanja sosednostne dimenzije grafa NP-težaven. Zato je smiselno določiti sosednostno dimenzijo za posebne družine grafov ali pa dobiti dobre meje za to invarianto. V tem članku določimo splošne meje za sosednostno dimenzijo grafa $G$, izražene z znanimi parametri grafa $G$. Preučujemo ostrost teh meja in za določene razrede grafov dobimo sklenjene formule. Pokažemo tudi, da obstajajo tesni odnosi med sosednostno dimenzijo in drugimi parametri, kot so npr. dominacijsko število, lokacijsko-dominacijsko število, 2-dominacijsko število, neodvisno 2-dominacijsko število, točkovno krovno število, neodvisnostno število in super dominacijsko število.

*Ključne besede: Sosednostna dimenzija, metrična dimenzija, lokacijsko-dominacijsko število, neodvisnostno število, super dominacijsko število.*

*Math. Subj. Class. (2020): 05C69, 05C7, 05C12*

*To delo je bilo delno podprto s tremi dotacijami s strani "Ministerio de Economía y Competitividad, Agencia Estatal de Investigación (AEI)" in "Fondo Europeo de Desarrollo Regional (FEDER)" (MTM2016-78227-C2-1-P, MTM2015-70531 in MTM2017-90584-REDT), Spain, ter s strani Junta de Andalucía, FEDER-UPO Research and Development Call, referenčna številka UPO-1263769.

†Kontaktni avtor.

*E-poštni naslovi:* sbernav@upo.es (Sergio Bermudo), jomaro@math.uc3m.es (José M. Rodríguez), juanalberto.rodriguez@urv.cat (Juan A. Rodríguez-Velázquez), jsmathguerrero@gmail.com (José M. Sigarreta)

To delo je objavljeno pod licenco https://creativecommons.org/licenses/by/4.0/