

ACKNOWLEDGMENTS

ABSTRACT

Primarily, I wish to acknowledge the influence of my supervisor Professor E. J.

Farrell. He managed to convince me to return to academia when I was settling down to a career in engineering. His presence in the text of this thesis and numerous helpful comments have been a great help in its final quality.

Dr. Robin Antoine assisted me in obtaining a copy of the *LaTeX* program which was used to typeset the thesis. I think he should be commended for introducing *LaTeX* and other software packages to me. Michael Hossain provided technical support in obtaining a PC for me, helping to install software, and trouble shooting when

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This thesis is an investigation into star covers of graphs: their enumerating polynomials and their possible applications. Star covers have many similarities with matchings of graphs but have not been as extensively studied. Enumerating polynomials of star covers are called star polynomials. It is shown that star polynomials carry a certain amount of information about the diameter of a graph. It is also shown how other polynomials can be obtained from the star polynomial, which enumerate certain equivalence classes of star covers. For strongly regular graphs it is shown how the parameters of the graph are related to certain coefficients of the star polynomial. A new algorithm is developed for computing star polynomials using the incidence matrix of a graph.

Certain kinds of star covers are useful in applications or have interesting properties. Enumerating polynomials for these are called restricted star polynomials. It is shown how certain kinds of restricted star covers, called X-centred star covers can be used in developing algorithms for solving many important practical problems, including set covering problems and timetabling problems.

Algorithms are developed for finding minimum weight star covers. Possible applications of minimum weight star covers are proposed in several areas; Coding Theory, location of facilities, Statistical Clustering.