Computer Physics Communications 15 (1978) 259–273

II. REDUCED SU(3) MATRIX ELEMENTS *

D. BRAUNSCHWEIG **
Dept. of Physics, University of Michigan, Ann Arbor, Michigan 48109, USA

Received 8 February 1978

PROGRAM SUMMARY

Title of program: REDUCED SU(3) MATRIX ELEMENTS

Catalogue number: ABKH

Computer: AMDAHL 470V/6, IBM 360/370; *Installation*: Univ. of Michigan, Ann Arbor, Mich.

Operating system: MTS

Program language used: FORTRAN

High speed storage required: 212 kwords

No. of bits in a word: 32

Overlay structure: none

No. of magnetic tapes required: none

Other peripherals used: card reader, line printer (card punch)

No. of cards of combined program and test deck: 907

CPC library programs used:

Catalogue number: ABKG

Title: REDUCED SU(3) CFPS

Ref. in CPC: 14 (1978) 109

Catalogue number: AAC*

Title: DATA FOR ABKG

Ref. in CPC: 14 (1978) 109

* Work supported by the U.S. National Science Foundation.
** Present address: Goddard Space Flight Center, Seabrook, MD, USA.

Keywords: Nuclear physics, SU(3), SU(4), shell model, matrix elements, nuclear structure, pseudo-SU(3), one-body operators, two-body operators, theoretical methods

Nature of physical problem
Reduced SU(3) matrix elements (RME) are calculated for a general one or two body tensor operator, between arbitrary shell model states in an SU(3) × SU(4) or SU(3) × SU(2) scheme. Matrix elements in the angular momentum scheme can then be obtained by multiplying these RME with the appropriate SU(3) ⊃ R(3) coupling coefficients available through the code of ref. [2].

Method of solution
One and two body tensor operators are explicitly constructed in terms of fermion creation operators. Since the ⟨BRA| and |KET⟩ states obtained by using the appropriate routines of the code of ref. [1] are also written in terms of fermion creation operators, the overlap can be calculated directly. This method is typically 2–3 orders or magnitude faster than the usual CFP expansion.

Restrictions on the complexity of the problem
The ⟨BRA| and |KET⟩ states are restricted to those that can be calculated with the code of ref. [1]. No other restrictions exist.

Unusual features of the program
The same array naming convention adopted in the code of ref. [1] is kept. This allows a saving of up to 35% of high speed storage in IBM 360/370 or similar operating systems.

References
[1] D. Braunschweig, Comput. Phys. Commun. 14 (1978) 109.
[2] Y. Akiyama and J.P. Draayer, Comput. Phys. Commun. 5 (1973) 405.