An Optical Model to Help Improving the Functioning of a Political Coalition

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Abstract. Sometimes, following stiff general elections, a country, a state or a province is governed by a "grand" coalition of two parties which has a cozy majority in Parliament, but, the two allies have been strongly opposing during their old and recent history. How could work efficiently such a Cabinet?

To model the structure and functioning of such a coalition and to generate hints how to improve it, the authors introduce and develop wave models, based upon the interference of partially coherent, two- and multiple- transverse waves, used in Electromagnetic Optics and by using correspondences between social and optical quantities. The models seem to fit the reality, f. e. in Romania or in Germany. They may be used in many fields where the leadership is split, but there is present a general common interest.

Keywords. Modeling of functioning of political coalitions, Grand Coalitions, Modeling Cabinet Relationships, Optical models in Sociology, Partially coherent transverse wave models, Econophysics, Modeling split leadership, Physics for Society, Systems theory.

1. Introduction: A possible social command for Physics models

As resulting from the November 30, 2008, parliamentary elections in Romania, there have leading two political been forces: the Democratic Liberal Party (PD-L) which had 115 (D) mandates in the Chamber of Deputies and totally 166 mandates 51(S) senators, and Social Democratic Party (PSD, allied with the very small Conservatory Party) which have163 mandates, 3 mandates less than PL-D: 114 D mandates and 49 senators, out of a total of 334 deputies and 137 senators in the present Romanian Parliament [10].

As the number of votes was concerned, the hierarchy after the elections of November 30, 2008 was reversed, with a difference in favor of PSD of about 1%, of the expressed and valid

votes (39.2% of the total electors participating in the pools, only).

Both PL-D and PSD parties pledged the victory in the parliamentary elections.

No one of these two parties could arrange coalition with the two smaller parties, previously members of the minoritary Romanian Cabinet and represented in the newly elected Parliament: the National Liberal Party (PNL), with a total a 65 D + 25 S mandates and an ethnic party, the "Democratic Union of the Magyars in Romania" (UDMR) having 22 D + 9 S mandates.

The solution found to insure stability in the country, in a time of a deep world crises (subprime mortgage, financial and economic, crises), has been to arrange a grand coalition, a Cabinet made out of ministers belonging to the main two opposing parties, PD-L and PSD, (with the exception of the Ministry of Justice, managed by an independent), parties having together a large majority in the Romanian Parliament (~70%), apparently, a cozy parliament majority to govern the country.

But, the two allies do belong to different European Parliament political families, have been strongly opposing, at national and local levels, during there history, during the previous Cabinet and during the electoral campaign.

How to model the possibility to work efficiently of such a Cabinet?

Physics is concerned mainly with modeling nature, but, by its wealth of modeled phenomena and due some similarity in structures and in relationships in nature and in society, Physics may offer solutions [2-9, 11, 12] for modeling social structures and relationships, forecasting behaviors and contributing to promoting HANDS ON ... SOCIETY.

2. Mechanical models

To model the functioning of such a coalition Cabinet and to generate hints how to improve it, the authors have tried to develop some models

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by making analogy with models for physical phenomena.

To explain the action, A, of such a grand coalition Cabinet, the compounding, like in Mechanics, of actions A_1 and A_2 of the two components:

$$\mathbf{A} = \mathbf{A}_1 + \mathbf{A}_2$$

as a scalar addition of the two superposed mechanical actions, is non adequate, when considering the present day Romanian political scenery.

(1)

Mechanical vector models are based upon compounding of momenta or of forces, like:

$$\vec{F}(\vec{r},t) = \vec{F}_1(\vec{r},t) + \vec{F}_2(\vec{r},t) .$$
(2)

Such mechanical models are not useful to model such a grand coalition Cabinet, too, because the actual two allied main political forces are almost equal in module, clearly opposing (acting in opposite directions) and consequently, the resultant action would be close to zero.

More, such time independent mechanical models might eventually describe only slowly evolving, rather coherent variations and therefore could not explain frequent political decisions subjected to fast internally and externally influenced mood oscillations and that the behavior of the political class is rather cyclical.

Such mechanical models could not explain and model the structure and the functioning of the Government of a grand coalition of divergent parties.

3. Wave Optics models

The authors think that, in order to model the interactions: between the political parties, inside political parties and the Cabinet's political structure and functioning, it is useful to introduce and develop wave models [2], particularly models of the interference of partially coherent waves used in Optics [1].

To explain such models and to be able to introduce the correspondences between optical quantities and the social ones, let us firstly consider the compounding of two waves.

The resulting elongation
$$\vec{E}(\vec{r},t)$$
 due to
the two present and interacting waves of known

elongations, $\vec{E}_1(\vec{r},t), \vec{E}_2(\vec{r},t)$, would be of the form:

$$\vec{E}(\vec{r},t) = \vec{E}_1(\vec{r},t) + \vec{E}_2(\vec{r},t).$$
(3)

Because of the slow response in the Cabinet's or Parliament actions (the detector), as compared with the high frequency of the waves (positions of the constituent political parties of the alliance) the measurable quantity (the effect) could not be associated with the resulting instant elongation of a wave , but with the intensity of the resulting compounded wave:

$$\overrightarrow{I(r,t)} = C^* < /\overrightarrow{E_1(r,t)} + \overrightarrow{E_2(r,t)}/^2 > \quad (4)$$

where C is a dimensional constant and <> stands for time average, during the duration of a detection process (duration of producing an effect: a law, a decision of the Cabinet, for example).

From (3) and (4) we get:

$$I(\vec{r},t) = C * (+ +$$

or $+ +)$ (5)

$$I(Q) = I_1(Q) + I_2(Q) + I_{1,2}(Q) , \qquad (6)$$

where, Q stands for the place and time of action, $I_1(Q)$ and $I_2(Q)$ are the intensities due to each wave contribution if alone in Q and $I_{1,2}(Q)$ (compounding term, interference term) stands for the contribution to the resulting action of the interaction of the two optical waves – political forces .

4. Scalar two-wave models

If, for the instant, one assumes the two waves would be real and scalar (or if transversal, they have parallel elongations only, the waves having parallel polarizations), socially - forces acting in the same way to the same end -, the intensity would be:

$$I = I_1 + I_2 + 2\sqrt{I_1 I_2} * \gamma_{12} * \cos \theta$$
(7)

where γ_{12} , the degree of mutual coherence between the two waves, might vary between [0,

+1] and the phase factor, $\cos\theta$, is varying between [-1, +1], because of the possible difference of phase between the two waves implied (of the gap of time between the oscillating action of the two political forces).

For a partial coherence of the interfering waves, the most common situation, the degree of mutual coherence is sub unitary:

$$\gamma_{12 \text{ pc}} < 1.$$
 (8)

The optical resulting field would be insensitive to totally incoherent, interaction of the waves (the allied parties) when, for each pairs of points in the field, S_1 and S_2 and for each instant t, the mutual degree of coherence would be:

$$\begin{array}{l} \gamma_{12nc}(t)=0\\ (9) \end{array}$$

In this case, of non coherence, the resulting intensity becomes:

$$I_{nc} = I_1 + I_2$$
(10)

The resulting intensity here is the summation of the intensities resulting from the two political parties if each one acting separately, non coherently and non disturbed by the other one.

But, is there possible that political parties not to interact?

If the two waves interact totally coherent (the two parties preserving their phase difference in their positions during interaction until reaching the effect), then

$$\gamma_{12tc} = 1 \tag{11}$$

and if the two waves be in phase one another (socially, both allies acting at the same instant in the same direction, with maximum amplitude),

 $\cos\theta = 1$ (12)

and due to the quasi equality of amplitude of the two components, in our case:

$$I_1 = ~I_2 = ~I_j$$
(13)
the interference term may become equal to:
$$I_{1,2} = ~2 I_j$$

and the resulting intensity, in case of total coherence and of in-phase action, becomes

 $I_{tc} = ~4 I_{j,}$ (15) resulting, due to additive coherent interaction (constructive interference, efficient alliance) in quadrupling the effect due to only one component, if that one would be acting alone.

The primacy of the national interest, if accepted by the allies, expressed by total coherence and in phase action, might ensure the optimum functioning of such a coalition.

If the interaction would be totally coherent, but the political forces always would act in opposition of phase,

$$\cos\theta = -1 \tag{16}$$

and preserving the conditions (11) and (13), the result of the superposing of the two equally intense, coherent, waves, from (7), in a destructive interference, would lead to:

$$I_{di} = I_1 + I_2 - 2 (I_1 \cdot I_2)^{\frac{1}{2}} = \sim 0 .$$
 (17)

That would mean, under unfavorable circumstances (mutual coherence, but opposition of phase, $\cos\theta = -1$), the diminishing of the resulting intensity up to the reciprocal annealing of the contribution of the two components, to no visible result in the Cabinet's activity.

This scalar two-wave approach may model a good performance of a system through a good co-operation between its components, coherent and in phase actions, a failure of the governing, due to opposition of phase, but not a coherent action in case of a opposition of phase approaches, which happen, sometimes, in the actual political life, where political forces have different reaction delay time.

It would be necessary to model the functioning of the mentioned Government, subject to common interest but under opposition of phase parties' actions.

5. Vector two-wave models

To model the working of such a coalition of two opposing forces the authors suggest to consider vector transverse waves.

In this case (8), one may consider the polarization of the vector transverse plane waves with the two elongations of the wave vectors making the angle α , as in the Fig.1:



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Fig. 1. Vector compounding of elongations

In such a case one has:

$$\vec{E_1} \cdot \vec{E_2} = E_1 E_2 \cos \alpha$$
(18)

the cosine of the angle α between the directions of polarization of the waves varying between [0, 1].

Eq. (5), (6) and (18) lead, in case of transverse waves, to:

$$I = I_1 + I_2 + 2\sqrt{I_1 I_2} .\cos a.\gamma_{12.} \cos \theta$$
(19)

which is a generalization, for vector waves, of the Eq. [7], valid for scalar waves, only.

One may see, from Eq. [19], that, when there is total coherence, $\gamma_{12} = 1$, and even opposition of phase [16], $\cos\theta = -1$, there is possible to have a significant resulting effect:

(20)
$$I = I_1 + I_2 = \sim 2 I_j$$

if the two waves be polarized perpendicularly, each other, because the interference term is annealed:

$$\vec{E}_1 \cdot \vec{E}_2 = 0, \text{ for } \alpha = \frac{\pi}{2}$$
(21)

This vector approach could model, for perpendicular elongations (20, 21), an acceptable level of efficiency of the Cabinet:

$$I = ~2 I_j$$
, for $\alpha = \pi/2$ (22)

not the maximal possible one ($I_{tc} = ~4 I_j$), but avoiding the minimal one (I = ~0).

In the case of perpendicular polarizations (actions), the interference term being zero, an opposition of phase between the two waves (parties) is not more annealing the result of the activity of the considered system (Cabinet, Parliament).

6. Political conclusions from a vector twowave model of a coalition

In case of a grand coalition between two opposing parties, it is to be supposed a strong opposition between ministers representing the two parties forming the grand coalition. The model suggests that there it is necessary to ensure, by a clever distribution of tasks and jobs within the Government:

a. The disjunction of the fields of competence of members of the two parties having responsibilities within the Government; they having to manage ministries which are not having influence in the same socio-economical field.

b. Simultaneously there would be necessary a strong coherence inside a ministry (or department) considered as a subsystem; to ensure the co-operation inside a ministry there is necessary to be managed by the representatives of the same party, at all decision levels, to ensure, as much as possible, the same type of political leadership in the hierarchy of the respective minister or department.

To disjoin the fields of activity managed by the ministers in the Cabinet or by prefects, in the country's administrative departments belonging to the two opposing (antagonist) parties participating in a grand coalition Cabinet, the ministries have to be thoroughly allotted to each partner in the grand coalition.

The allotment may vary in different countries, in different periods, depending of the tradition, culture, political maturity, relationship with the past or opening to their future, priorities in political debates and fights, the fields of previous expertise and the existence of professionally and politically competent people within a party.

Probably, some domains have to be managed by experts not politically affiliated.

The time perspective is very important. Electoral Campaigns may change the options of the parties depending of the characteristics of the electorate favorable to that party and of the perspectives to conquer electorate to the next poll.

But the perception is different in different countries, in different periods and different political and economic contexts.

The repartition of ministries is specific to each grand alliance and to each considered period.

From the choice of ministries there could, eventually, be possibly to understand the position of each partner in a grand coalition and the priorities given to concrete issues of different social domains by each partner: investment, infrastructure, pollution, education, research.

7. A few examples of repartition of ministries between the allies by two grand coalitions in Europe

There are, following, a few examples of allotting ministries to partners in a grand coalition from the expertise of two grand coalitions, in Europe:

- Angela MERKEL's Cabinet of Germany between 2005-2009, which was the result of a grand coalition between Christian Democratic Union (CDU) allied with the Christian Social Union (CSU), its Bavarian sister party, and the Social Democratic Party of Germany (SPD), grand coalition established after the German federal polls of November, 22, 2005 (DE) and

- Emil BOC's Cabinet of Romania, 2008-2009, which was a grand coalition between the Democratic Liberal Party (PD-L) and the alliance of the Social Democratic Party (PSD) with a very small Conservatory Party (PC), resulting at the initiative of the new president of Romania, Traian BASESCU (PD-L), from the November 30, 2008, parliamentary polls in Romania (RO).

The coalition leaders, possibly, agreed that ministers from different opposing parties would have to manage domains as much as possible not directly connected between them, not having large influence in the same socio-economical field, like, f. e. ministries which contribute mainly to the Government revenue vs. ministries which ensure the spending of the Government or ministries which regulate those activities which contribute to increase pollution vs. ministries which are charged to decrease pollution.

As ministries which contribute mainly to the Government revenue vs. ministries which ensure the spending of the Government are to be mentioned:

- The Ministry of Economy (PD-L) vs. the Ministry of Labor, Family and Social Protection PSD (RO, 2008-9) and

- The Ministry of Economics and Technology (CSU) vs. the <u>Federal Ministry for</u> <u>Family Affairs, Senior Citizens, Women and</u> <u>Youth</u> (DE, 2005-9).

The approach of the two grand coalitions was, here, the same, in both Germany and Romania.

As regards ministries which supervise activities which contribute to increase pollution vs. ministries which are charged to decrease pollution, the same perception was prevalent for both coalitions: - The Ministry of Economy (PD-L) vs. Ministry of <u>Environment and Sustainable</u> <u>Development</u> (PSD), in Romania and respectively,

- Ministry of Economics and Technology (CSU) vs. <u>Federal Ministry for Environment</u>, <u>Nature Conservation and Nuclear Safety</u> (SPD), in Germany.

In both countries, the national security responsibilities were distributed between the partners in the same way:

- The Federal Foreign Affairs Ministry (SPD) vs. the <u>Federal Ministry of Defense</u> (CDU), DE and

- The Ministry of Foreign Affairs (PSD) vs. the Ministry of National Defense (PD-L), RO.

Ministries of Justice, of Foreign Affairs or of Defense could be given to any of the parties partners in a grand coalition or to experts, there acting national interest.

In Romania, the Ministry of Justice is managed by a lawyer, politically not affiliated.

Ministries in the same side of the Government balance sheet were being given to the ministers belonging to the same party:

- The Ministry of Public Health and the Ministry of Labor, Family and Social Protection have been given to PSD (RO, 2009), and

- The <u>Federal Ministry of Health</u> and the Ministry of Labor and Social Affairs belonged to SPD, DE.

Ministries dealing with close issues (eventually with intersection of tasks) were managed by members of the same party:

- The Ministry of External Affairs and the Department of European Affairs, managed by PSD (RO) and

- The Federal Foreign Ministry and the Federal Ministry of Economic Cooperation and Development were managed by SPD, in DE.

The previous examples illustrate the same view, attitude and approach of the role of the mentioned ministries in both countries, but in other cases, some ministries were distributed differently by the two coalitions because of different perception on the roles of the ministries in the respective fields, with respect with the main criteria of selection, f. e.:

- The Ministry of Economics and Technology belonged to CSU, as well as the <u>Federal Ministry of Food, Agriculture and</u> <u>Consumer Protection</u> in Germany, but not in Romania where, - The Ministry of Economy was lead by PD-L, but the Minister of Agriculture and Development belonged to the antagonistic partner, PSD, possibly because, in the two countries, the two fields have an opposite contribution to the Government balance sheet.

The relationship between economy and transportation was approached differently, in DE and RO:

- The Ministry of Economy and the Ministry of <u>Transport and Infrastructure</u> were managed by the same party, PD-L, in RO, but

- The Ministry of Economics and Technology was managed by CSU and the <u>Federal Ministry of Transport, Building and</u> <u>Urban Affairs</u> were managed, in DE, by the opposing party, SPD.

The strategy of development was different in the two countries with respect to sustainability:

- The Federal Ministry of Transport, Building and Urban Affairs and the Federal Ministry for Environment, Nature Conservation and Nuclear Safety were managed in Germany, by the same party, SPD, but

- The Ministry of <u>Transport and</u> <u>Infrastructure</u> was managed by PD-L and the Ministry of <u>Environment and Sustainable</u> <u>Development</u> was managed by the opposing party, PSD.

A completely different approach by the two grand coalitions refers to the position of Education and Research:

- The Ministry of Economy was lead by PD-L vs. the Ministry of Education and Research which was managed by PSD, in Romania (possibly, Education and Research being considered a consumer of nation resources) and

- The Ministry of Economy and Technology was lead by CSU and the <u>Federal</u> <u>Ministry of Education and Research</u> was managed by CDU (Education and Research being considered in Germany, a generator of resources).

8. Other possible political considerations induced by the two - vector wave model of a coalition

The introduced model, implies that always should be desirable a simultaneous coherence, parallel and in-phase action inside a ministry considered as a subsystem.

Because a Cabinet includes many levels of decision and is a dynamical hierarchic structure, there must be ensured the efficiency of the alliance at each level of decision, by ensuring the same party leadership for a branch of a hierarchical structure, at all its political decision sub levels.

Within a ministry (lead by members of only one party), must be ensured the maximum of cooperation and coherence. For example, both in Germany Cabinet 2005-2009, and Romanian's one 2008-9, all secretaries of state and state ministers, at all ministries, belong to the same party: PD-L or PSD/PC in RO, respectively to the CDU/CSU or the SPD, in DE.

The prefect (RO – highest representative of the Cabinet in a regional administrative department - judet) and his (her) vice prefects, in the same department belong to the same party.

Socially, a fast proof of the validity of such a vector wave interference model, would be the presence of oscillating decisions of the Government and of the Parliament, in case of superposition of responsibilities belonging to the members of the two allied parties, resembling to the generation of interference fringes in the case of superposition of partially coherent optical waves. Such oscillating decisions have been present, in both RO and DE.

Due to the relative volatility of the relationships between the two components of a grand alliance – the variability of the interference term (see Eq. [5] and [19]), it is possible that the efficiency of the activity of the Cabinet, due to apparition or of new issues or changes in positions on different existing issues may vary in large limits, if the interference term becomes significant and when there are, both, a parallelism of actions and an opposition of phase in their actions.

More, for real alliances, the correlations between the actions of the partners in the alliance may change in time, the allies could reconsider their positions and interests and redistribute the ministries between the two parties.

Two socio-economic domains which at a given instant could be considered as not connected, later become strongly connected and an efficient governing with respect to the national interest would require an other distribution of ministries as that was at the beginning of the activity of the Cabinet.

The Cabinet itself might become very labile in time, leading to a breaking of the grand coalition itself, depending not only upon the external environment evolution but on the evolution of relationships between the leaders at lower hierarchical levels.

It is important too to ensure the same political leadership regional administrative to departments' branches of state companies belonging to a ministry. There could appear contradictions, when doing such a distribution of tasks with the requirement suggested by the introduced model that all structures in an administrative department have to be subordinated to the same party. These contradictions may lead to local quarrels which may propagate upwards with possible deep consequences on the coalition.

A solution to avoid such possible difficulties would be to ensure the management of local services and companies as well as of lower level units in ministries by professional managers selected upon competition without the interference of political parties partners in a shorter or a longer coalition.

Possibly, the duration of o grand coalition is rarely as long as the whole mandate of the Parliament (which has happened in RO, in the autumn of 2009).

In Romania, in 2008, during the negotiations for the construction of the new government, it was clear that, in spite of some understanding and comprehension at the top, regarding the national interest (like: developing the integration into European Union and diminishing the effects of world financial and economic crises), it was lack of trust at lower levels.

To be able to build the Government in due time, it was decided that the two political parties, PD-L and PSD:

- have an equal number of ministers, the two allies choosing the ministries alternatively one by one and that:

- each minister has the right to choose, for the inferior political positions in his (her) ministry, members of his (or her) party, only.

For the Government be the most efficient, under the present model rules of governing, it would mean:

No interference for perpendicular polarizations!

Maximum interference for parallel polarizations!

9. Conclusions

To conclude, as the structure and the rules of functioning of a grand alliance of opposing political parties are concerned, it is to be convened and observed by the partners:

- a, as small as possible, superposition of the domains managed by ministers, in the

Cabinet of the opposing but allied political parties (to ensure the smallest interference through "parallel polarizations") and

- coherence and in-phase action, maximal co-operation inside each ministry (and between prefects and their sub-ordinates) maximum interference for subsets interfering with parallel polarizations!

A ministry has to be entirely allotted to a partner not only a position of minister.

A sociological survey in different countries (Germany, Romania also.) and at different levels (nation, state, province or region) may contribute to quantify the proposed model and to thoroughly check and evaluate it.

The introduced Physics models may be also useful in explaining and helping to improve the management of companies under divided leadership.

The conclusions drawn from these models could help political class and respectively the management of companies to insure stability in the system during, f. e., a deep world crisis (subprime mortgage, financial, economic, crises) or in a stiff competitive environment.

The developed model shows the perennial value of the saying "union is strength", a coherent, parallel and in phase compounding of two actions producing up to the squared of the simple addition and explaining the success of some grand coalition Cabinets during external threats or natural catastrophes, of well trained sport teams, of specially trained army forces or of some criminal organizations.

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