COLLOQUIUM

임계점 방정식과 아인슈타인 계측

(Critical Point Equation and Einstein Metric)

▣ 연 사 : 장정욱 교수님(단국대학교)

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▣ 대 상 : 수학전공 학부생 및 대학원생

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Abstract

On an n-dimensional compact orientable manifold M^n with constant scalar curvature, we look into the following equation.

$$Z_g = S'_g{}^*(f).$$

We call this equation critical point equation. Here, we used the following notations.

- ○ r_g is the Ricci tensor.
- ○ $z_g = r_g - (s_g/n)g$ is the traceless Ricci tensor.
- ○ $S'_g{}^*(f) = D_g df - \Delta_g f g - f r_g$ is the L^2 adjoint operator of the linearization of of the scalar curvature s'_g given by

$$s'_g(g) = \Delta_g tr\, h + \delta_g{}^* \delta_g h - g(h, r_g).$$

A standard variational technique tells us that the metric g is critical of the total scalar functional restricted to the metric with volume 1 if and only if, there is a function f on M^n satisfying critical point equation. Now the following conjecture arises naturally.

<u>Conjecture</u>. *If there is a non-zero function f satisfying critical point equation, then the metric g is Einstein.*
We will study properties of this conjecture and give some positive partial answers to this conjecture. For example, we investigate the relation between stable minimal hypersurfaces of M^n and the kernel of $s'_g{}^*$ which can be a topological obstruction of the conjecture. Also we deal with the warped product spaces satisfying critical point equation.