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## On reconstruction procedure for special spherically-symmetric metrics in scalar-Einstein-Gauss-Bonnet model: the Schwarzschild metric test

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The  $4d$  gravitational model with real scalar field  $\varphi$ , Einstein and Gauss-Bonnet terms is considered. The action contains potential term  $U(\varphi)$  and Gauss-Bonnet coupling function  $f(\varphi)$ . For a special (static) spherically symmetric metric  $ds^2 = (A(u))^{-1} du^2 - A(u)dt^2 + u^2 d\Omega^2$  with  $A(u) > 0$  ( $u > 0$  is a radial coordinate) we verify and correct the so-called reconstruction procedure suggested by Nojiri and Nashed. This procedure presents certain implicit relations for  $U(\varphi)$ ,  $f(\varphi)$  which lead to exact solutions to the equations of motion for a given metric governed by  $A(u)$ . Here we apply the procedure to (external) Schwarzschild metric with gravitational radius  $2\mu$  and  $u > 2\mu$ . Using “no-ghost” restriction (i.e. reality of  $\varphi(u)$ ) we find two family of  $(U(\varphi), f(\varphi))$ . The first one gives us the Schwarzschild metric defined for  $u > 3\mu$  and the second one describes the Schwarzschild metric defined for  $2\mu < u < 3\mu$  ( $3\mu$  is the radius of photonic sphere). In both cases potential  $U(\varphi)$  is negative.

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